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DISCOVERY

A MONTHLY POPULAR JOURNAL OF KNOWLEDGE

EDITED BY EDWARD LIVEING, B.A.

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A TEMPLE BUILT ABOUT 5,000 YEARS AGO

A portion of one of the recently excavated Later Stone Age Temples at Malta

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JOHN MURRAY, 50A ALBEMARLE STREET, LONDON, W.1.





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DISCOVERY. A Monthly Popular Journal of Knowledge.

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Editorial Notes

THE Hawthornden Prize, given annually "for the best book published during the year by a writer under forty years of age," was presented by Mr. John Masefield to Mr. Edmund Blunden on June 29, for his latest volume of poetry, *The Shepherd*. Many of our readers will remember an article which Mr. Blunden wrote for DISCOVERY a year ago on John Clare, the peasant poet of Northamptonshire; some, no doubt, have read Mr. Blunden's work in *The Waggoner* and *The Shepherd* and been impressed by its full colour and detail, reminiscent of the landscapes of the old Dutch painters, and by an inspiration which seems to spring out of the heart of our English countryside. Indeed the dominant characteristic of this young poet's work is its quality of expressing not only the material appearance of our landscapes, but the hundred and one associations, sensations, emotions which they rouse in individual English hearts. If Mr. Blunden can use his strong feelings for rural beauty as a background before which English men and women play out their lives, he may develop into a very great poet. This remains to be seen.

* * * * *

It has been said that the greatest works of art and literature have never been created out of a cosmo-

politan atmosphere, but have been derived from the national environment and sympathies of their creators. But the world is changing fast, and individually and racially we are becoming more cosmopolitan in environment and mind. In these columns we have consistently advocated the fostering of a friendly and peace-loving spirit amongst the nations of the world, but we cannot conceive of an age in which powerful, innate, cherished national characteristics shall have disappeared any more than we can conceive of an age in which all individuals have been reduced to a set standard of mental and physical attainments. The idea is both abhorrent and futile. Attempts at cosmopolitanism in literature have never been attended with much success. In this connection Paul Bourget's novels, with their tendency to present, instead of characters, so many caricatures of nationality, come to one's thoughts; as also the novels of Joseph Conrad, who has attained his triumphs, not really by probing the Oriental mind, but by showing the strangely contrasting characteristics of the white man, with his complex of ideals and materialism unintelligible to the Easterner, against an Oriental background.

* * * * *

There are few countries or nations so individualistic as these islands and their inhabitants. We feel that this is not a statement biased by patriotism. It is a fact which comes home very vividly to any Englishman returning to his country after a long sojourn abroad. Often he is disappointed for a while. The effusive welcomes, friendships, and society to which he has grown accustomed are wanting; the streets are filled with serious faces; there is a coldness of manner about his countrymen which is difficult to understand. But gradually, as he picks up the threads of national life, remakes old friendships and forms new ones, he is conscious of the deep affections and steadfast characters of those around him. He says to himself, "I have felt with my native land, I am one with my kind," and he is rightly proud of his own people and of his birthright which unites him to them. The winter, with its mists and damp cold, gives way to

the deep greens, thick hedgerows, sparkling showers, and drawn-out sunsets of an English summer, which has an incomparable freshness and fragrance. It is not surprising that our literature is imbued with an unusually distinct national spirit ; that many of our most beautiful lyric poems, *Summer is i-cumen in*, Milton's *L'Allegro*, Keats' *Ode to Autumn*, could have sprung from no other people or countryside than our own ; that our finest narrative poetry from Chaucer's *Canterbury Tales* to Masefield's *Reynard the Fox* teems with the sights, sounds, customs, and individuals peculiar to our country ; that the greatness of *Vanity Fair* lies in its unconsciously expressed attitude of the Britisher to life rather even than in the gentle irony with which it attempts to expose that attitude ; and the greatness of *Far from the Madding Crowd* in the beauty of the wide spaces of Dorsetshire, which is revealed not so much in direct description as in the conversations and thoughts of the native characters, which have been moulded by them.

* * * * *

With all our superficial differences in character, we share with one another the main instincts and intuitions of humanity, and the man who knows himself is most capable of understanding, and sympathising with, his fellow human beings. This realisation may, perhaps, be applied without stretching a point to literature of a strong national trend. One nation is as much part of the world as one individual is part of a nation. If an individual writer is true to intuitions arising out of racial emotions, he is more likely to be true to the deep underlying emotions of mankind generally than the writer who attempts to be cosmopolitan. The great Greek tragedians are classic examples even to-day of this fact, but no more obvious example could be given than the plays of Shakespeare. As we write these notes the scene of the hero's death in *Antony and Cleopatra* comes vividly to mind.

* * * * *

Holding her dying lover in her arms, Cleopatra, half-mad with grief and a woman's passionate desire to save the object of her love with her caresses, says :

welcome, welcome ! die where thou hast lived :
Quicken with kissing : had my lips that power,
Thus would I wear them out.

Antony addresses her as Egypt, and this sudden word sums up the intricacy of the man's attitude to the woman representing the country, the fine and the false ideals, the love of the woman herself, everything, in fact, for which he has lived and is perishing. Then follows a noble passage in which the man, despite

his pain, is intent on securing the woman a happy future, and the woman is equally intent on preserving her honour and following her lover to death :

Ant. One word, sweet queen :
Of Cæsar seek your honour, with your safety. O !
Cleo. They do not go together.
Ant. Gentle, hear me :
None about Cæsar trust but Proculeius.
Cleo. My resolution and my hands I'll trust ;
None about Cæsar.

When Shakespeare wrote these magnificent lines, he wrote them for an English audience, and he drew a picture, full of the English sense of chivalry, of his ideal Englishman and his selflessness under stress of terrible emotion, of a type which he knew would appeal to other members of his race as well as to himself. And yet, could any scene be truer to the high emotions and aspirations of mankind in all lands and ages ?

* * * * *

Last November we drew attention in these notes to the lack of interest amongst our so-called educated classes in the scientific and scholastic achievements of the day. We remarked that the fault lay partly with the public and partly with the research workers. A similar statement must be applied to contemporary literature. In awarding the Haworthden Prize Mr. Masefield declared that "I am convinced that, if some great wave of encouragement for art comes to these islands, there will come a great wave of artistic effort, which will inspire even the most aged of artists to begin anew." At the present moment there is a lamentable lack of encouragement by the public of good creative writing. The fault lies, perhaps, rather with the changes which are affecting us nationally and individually than with the artist or his public. Whatever the cause, an ever-widening gulf is appearing between those writers who set out merely to appeal to the man who wants an easy piece of sentimental drivel to intoxicate his week-end, and the more brilliant set who, in an endeavour to avoid appearing "popular," have become only dull or neurotically sordid and gruesome. This is, of course, particularly true of the novel, the "best sellers" looking to their public and their pockets, and the better class writing more with their heads than with their hearts, and often attempting to gain an atmosphere of cosmopolitanism. We feel that, if only some authors will come forward with creative work reflecting the true, the average life and characteristics of our people and the beauty of their islands, and yet showing the changes that are taking place in their traditions and social environment, a remarkable re-nascence in literature may ensue.

Sex and its Determination—I¹

By J. S. Huxley, M.A.

Fellow of New College, Oxford

SEX appears to be absent in one great group of organisms, the Bacteria. There are also here and there a few species of plants which only reproduce asexually—the banana, for instance, never sets seed; it is therefore clear that sex is not a necessary accompaniment of life. Why, then, is it so widespread?

The answer is given by the well-known facts of Mendelian heredity. Through sexual reproduction, the factors in the chromosomes are at each generation shuffled and recombined in new arrangements; and this provides the possibility of combining separate advantageous mutations in a single stock. If, for instance, a tall pea with green seed-coat is crossed with a dwarf pea with yellow seed-coat, all combinations will occur in the second generation—tall yellow, tall green, dwarf yellow and dwarf green. If tallness and yellow colour happened to be more advantageous than dwarf size and green colour, then it is obvious that any race which possessed both these characters would be well placed in the struggle for existence. If crossing were impossible, such a race could only arise if both the favourable mutations were to occur in one line. To put it in the most general terms, we may say that, if separate mutations arise in a species in a given time, then if sexual reproduction does not exist, the result will be x varieties; but if it does exist, then by recombination 2^x varieties are possible. If the number of mutations had been ten, the number of varieties would be 10 in the one event, 1,024 in the other. The existence of sex thus obviously favours constructive change, and makes it possible for a species, if the conditions in which it finds itself alter, to adapt itself to them much more rapidly.

It has been supposed that sexual fusion of cells was accompanied by some mysterious rejuvenation, without which the race would die out. This, however, is becoming more and more doubtful. For one thing, it has been found possible by special treatment to keep various unicellular animals like the Slipper Animalcule (*Paramecium*) reproducing by fission for apparently indefinite periods without any sexual process of conjugation occurring, although conjugation is a normal process in their life-history. The evil effects of inbreeding were supposed to proceed from a similar lack of fresh blood, from the absence of that fusion of gametes from different stocks which normally

happens in sexual reproduction. Here again we are now able to give a different and more satisfactory explanation. In an ordinary animal or plant, mutations are occurring all the time. Many of these are unfavourable—they represent little accidents to the factors, to the machinery out of which a normal organism is built up. But most of such harmful factors are recessive; that is to say, they may be carried by an individual which is also carrying the dominant factor of the same pair, without any effects being produced; this is so, for instance, in the case of tall and dwarf peas, which when crossed give hybrids containing the factors for both tallness and dwarfness, and yet indistinguishable by inspection from their tall parent. In a large cross-bred population, it will be only rarely that individuals containing

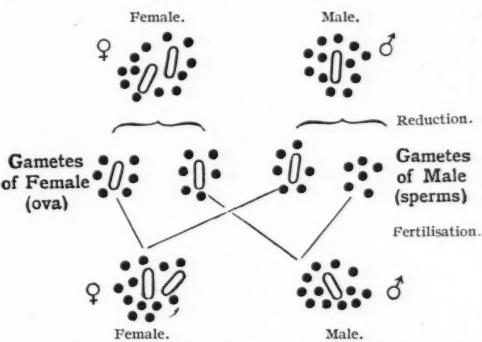


FIG. 1.—DIAGRAM OF THE BEHAVIOUR OF CHROMOSOMES AT REDUCTION AND FERTILISATION IN AN ANIMAL WITH TWO X-CHROMOSOMES IN THE FEMALE, ONE IN THE MALE.

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two of these harmful recessive factors will be segregated out. But if inbreeding is practised, a little calculation will show that it will produce a number of different stocks, each of them pure for the various factors which were present in the original population. As a result, the recessive factors will appear pure in a number of these stocks, and will exert there any harmful effect they may have; and the general average of the population, in vigour, health, size, and fertility, will go down very considerably. But the poor types can now be rejected by the breeders; and the good types which are left are known to be pure and to possess no more harmful recessive factors. Thus, when the good types are now crossed together, a stock is produced which is as good in appearance as the original, and has the further merit of not continually producing a certain proportion of low-grade individuals. Thus the *immediate* effect of inbreeding on a large mixed population is bad; but if it is judiciously practised, it may be the best means of building up a pure healthy stock. That it cannot be always and

¹ Readers are referred to previous articles on Heredity by the same author in Vol. I, pp. 199 ff. and pp. 233 ff., of this journal.—ED.

DISCOVERY

inevitably bad is shown by the fact that there exist some animals and a number of plants in which self-fertilisation—the most rigid form of inbreeding possible—is the invariable rule. In brief, it may be said that our understanding of Mendelism has made it clear that inbreeding is only bad when hidden harmful factors exist in the stock, and that it is harmless

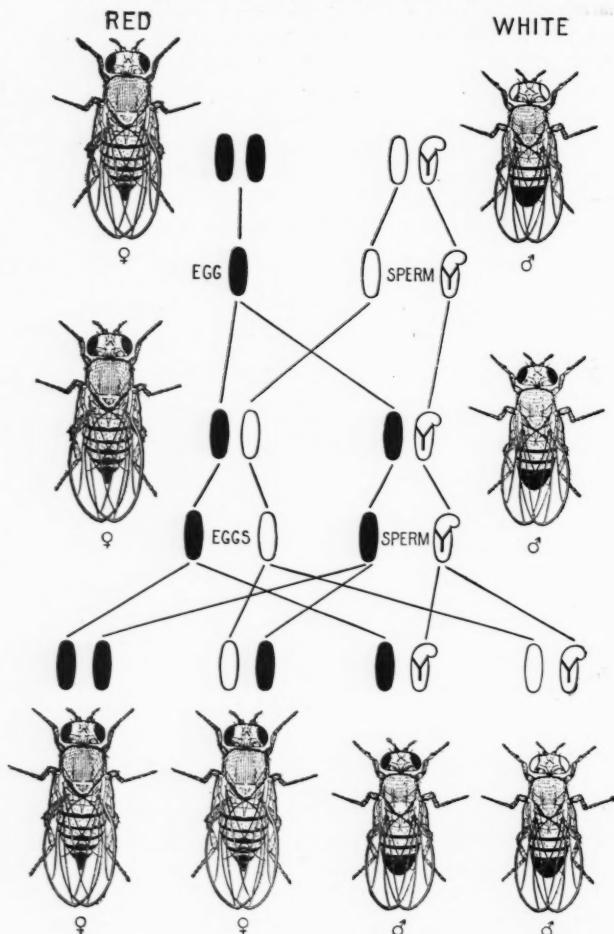


FIG. 2.—SEX-LINKED INHERITANCE OF WHITE EYE IN DROSOPHILA. Females on left, males on right. The sex-chromosome behaviour is represented diagrammatically; the chromosome bearing the factor for red eye is represented in black, that bearing the factor for white eye in outline.

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and even good when the stock's hereditary constitution is a good one. The ecclesiastical prohibition of the marriage of near relatives is thus seen to be only conditionally justified on biological grounds.¹

¹ The stimulating effect which often follows a cross between markedly different stocks, while also explicable in terms of factors, is due to rather complex causes. The reader is referred to the book by East and Jones.

Two quite distinct processes are involved in the fertilisation of egg by sperm which occurs in the ordinary sexual reproduction of man and most animals. First there is the fusion of two separate nuclei, two single sets of chromosomes, and the consequent shuffling and recombination of the hereditary factors. In the second place, there is what is usually called *activation*—the starting-off of the egg upon its career of growth and development. In most species, if fertilisation does not take place, the egg remains inert, and sooner or later perishes. However, in some animals, such as Aphids (plant-lice) and water-fleas, the egg is capable of developing without this stimulus. Such forms are called parthenogenetic. The bee is of especial interest, since the males, or drones, are fatherless, produced parthenogenetically, while the queens and workers all arise from fertilised eggs. In the course of evolution, a change must have come about so that activation is no longer carried out by the sperm, but by some other means. What in these

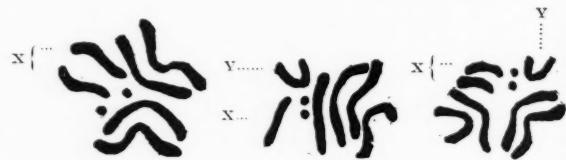


FIG. 3.
(a) Of normal female Drosophila.
(b) Of normal male.
(c) Of an XXXY female individual.

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animals has happened naturally, has been accomplished artificially for others. In many creatures, such as sea-urchins and starfish, marine worms, molluscs, and even frogs, it has been found possible to make the egg develop without sperm. In sea-urchins the best method is immersion in certain chemicals; in starfish it is heat or shaking; in frogs it is pricking with an extremely fine glass needle which has been dipped in blood. The result is the same—that fatherless individuals are produced by man's intervention. Some of the fatherless frogs have been raised in the ordinary way, and are apparently healthy in every respect. This shows us that the sperm normally performs two functions: it contributes a quota of hereditary factors from the father to the developing embryo; and it activates the egg, probably by chemical means, to start its career of growth and division. This *artificial parthenogenesis* has so far only been tried upon animals which lay their eggs into the water before fertilisation; there can be no doubt, however, that it is theoretically possible in other forms, and that it would be only a matter of surmounting technical difficulties (although

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these would doubtless be very grave) to apply it to mammals and to human beings.

The original reason for the wide occurrence of sex is to be sought in the greater plasticity it confers, the greater power of varying in response to changed conditions; but once it was established it reacted markedly upon the later history of life. The gametes are primitively alike; then a division of labour occurs, and the male gamete or sperm takes on the function of finding the female gamete or ovum, which is concerned with storing up food-material for the future development of the embryo; then the individuals which produce the different gametes become different in other ways,

that our instincts and the emotions associated with them are the driving force of our actions; that the most primitive instincts, such as those of fear and of sex, are perennially active in us; but that the human mind possesses the power called by psychologists the sublimation of instincts, whereby the instinct becomes directed towards other objects—its driving force harnessed to new, more exalted, and more spiritual ends. So fear becomes the basis of reverence and awe, the sexual instinct gives rise to the highest sympathy, the most universal love.

Sex is thus intertwined, inevitably and fundamentally, with all our activities and with our very being.

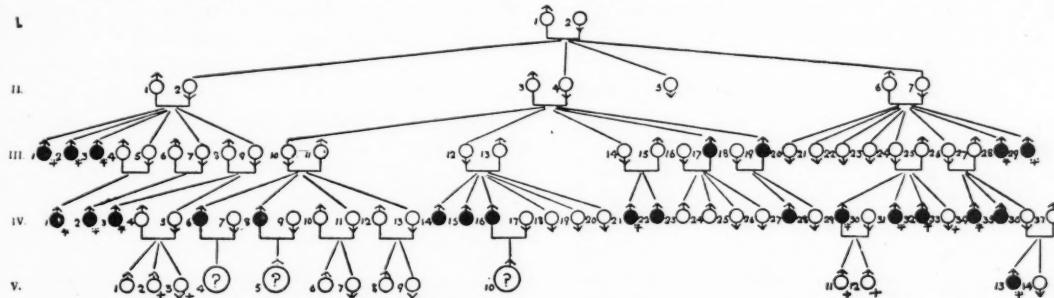


FIG. 4.—PEDIGREE OF A FAMILY IN WHICH HEMOPHILIA OCCURRED; AFFECTED INDIVIDUALS ARE MARKED IN BLACK.

♂ = male, ♀ = female. Note that the affected individuals are all males; that they do not produce affected children.

Reproduced from "The Treasury of Human Inheritance," by kind permission of the Director of the Galton Laboratory, University of London.

the male generally more active, the female generally more passive and concerned with the nourishment and care of the young. As mind develops, new complications arise; in the first place, the female requires to be courted and stimulated, her emotions roused, before she will yield to the male; from this cause there have arisen the elaborate and wonderful ceremonies and displays of courting animals, associated often with special colours and structures. Sometimes the result is grotesque, as in the wattles and bare coloured skin of the cock turkey, or the coloured posteriors of many male monkeys; more often the effects are striking, as in the gleaming metallic patches on the legs of many male spiders, displayed to best advantage during their strange courtship dances; or they are of real beauty, like the song of the nightingale or the thrush, the colours of the cock humming-bird, the plumes of the egret, the train of the peacock. It may be indeed said that the sense of beauty has mainly sprung out of the relation of the sexes, and that the actual beauty of animals, where it does not depend simply upon regularity of form, or upon the sense of power or of speed or of vitality produced on us by certain creatures, is due originally to the existence of individuals of separate sexes with emotions which must be touched before sexual union can be consummated. Finally, in man himself, recent work in psychology has shown

Man and woman differ from each other, not only in body but in mind; and such is our mental architecture that there are few activities of life in which the sex-instinct, however transformed and sublimated, does not play some part. It thus becomes of the greatest interest to discover the mechanism by which sex is determined, and to find out whether by any means we can bring it under our control.

To do this it is necessary to revert once more to the lower animals. In discussing heredity, we said that the chromosomes of any species were present in pairs, the members of each pair being similar. In a number of species there is an exception to this rule. In certain insects, for instance, while all the chromosomes of the female can be arranged in pairs, those of the male cannot. On closer examination, this is seen to be due to the fact that the male has one less chromosome than the female, and that therefore it only possesses one instead of two of one particular kind of chromosome. This sort of chromosome has been called the X-chromosome. When the female comes to form eggs, ordinary reduction occurs; the two members of each pair separate from each other, and all the eggs receive one X. In the male, however, the X has no mate to pair with; accordingly half the sperms will contain an X, half will be without one. If a sperm with an X fertilises an egg, the result will

be XX—in other words, the constitution characteristic of a female; whereas if the "no-X" sperm fertilises an egg, the result will be X—in other words, a male. As the two sorts of sperm will be produced in equal numbers, an equal number of XX and X embryos will be formed, and this will result in an equal number of adult males and females (Fig. 1).

A similar state of affairs is to be found in many other animals, including cattle, horses, and pigs, and probably in man himself. In other cases, the male, instead of possessing simply an unpaired X, has an unequal pair of chromosomes, one being like the two found in the female, and therefore called X, the other unlike, and called Y. Here again there will be two sorts of sperms; the X-bearing will produce females, the Y-bearing will produce males.

Let us now turn to the results of breeding experiments. Besides ordinary Mendelian inheritance, there has for some time been known another type, known as sex-linked inheritance. An example will make this clear. A mutation producing white instead of red eyes was discovered in the fruit-fly *Drosophila*. When a white-eyed male is crossed with an ordinary female, all the offspring are red-eyed, showing that white is recessive. In the second generation, there appear 75 per cent. red-eyed animals and 25 per cent. white-eyed, as in a normal case of Mendelian inheritance—but the white-eyed individuals are all males. Still more strange, if the cross is made the other way, between a white-eyed female and a red-eyed male, a quite different result is obtained. In the first generation all the daughters are red-eyed like their father, and all the sons white-eyed like their mother; in the second generation, 50 per cent. are white-eyed, and males and females are equally affected.

The fruit-fly is one of those animals in which the male possesses one X and one Y chromosome. If we suppose that the Y is inactive—a supposition which is, as a matter of fact, borne out by other evidence—this curious and at first sight very puzzling form of inheritance is exactly what we should have to prophesy mathematically, if the factors for redness and whiteness of eye-colour were situated in the X chromosome (Fig. 2). That this view is correct, at least for the fruit-fly, has been definitely shown. Certain stocks of the fly were found which gave exception to ordinary sex-linked inheritance. These exceptions were to be expected if, through some accident to the machinery of cell-division, animals were to have been produced which contained a Y in addition to two X's; and when the stock was examined microscopically, it was actually found that this was the case (Fig. 3).

Exactly similar sex-linked inheritance is found in most other insects, in mammals, and in man himself. For instance, the human diseases known as hemophilia (habitual bleeding due to the inability of the blood to clot) and night-blindness are transmitted in this way (Fig. 4). It is also found in some plants in which the sexes are borne on separate individuals. Since in *Drosophila* the association of sex-linked factors with X-chromosomes is certain, and in many other animals in which it occurs in the same way, the male also possesses a single X, or an X and a Y chromosome, we may safely say that sex-linked inheritance implies the existence of sex-chromosomes different in the two sexes, and vice versa. It is a curious fact that in birds and in butterflies and moths, while sex-linked inheritance occurs, it is reversed; the female more often shows the sex-linked characters, not the male, and the facts can only be explained if we suppose that in these animals it is the male who possesses two X chromosomes, the female but one. This supposition has been proved to be true in moths, where the microscope reveals that the females have one less chromosome than the males.

(To be concluded in the September number)

The Temples of the Later Stone Age at Malta

By Professor T. Zammit, C.M.G.

Curator of the Valletta Museum

THE remains of the megalithic buildings¹ at Hagiar Kim and Mnajdra, not far from the villages of Krendi, Tarxien, Hal-Saflieni, and Cordin, close to the grand harbour of Valletta, as well as the Gigantea in the island of Gozo, are marvellous examples of Neolithic art—the art of the Later Stone Age.

The ruins of the group of temples on the way to Tarxien are of recent discovery, and their excavation has yielded archeological material which throws considerable light on the Neolithic culture of the Mediterranean basin.

The type of these temples corresponds to that of the other Maltese large megalithic buildings which consist of egg-shaped compartments, parallel to each other, and connected by short dolmenic² corridors. A wall

¹ The term "megalithic" is applied to these buildings owing to the fact that they are for the most part constructed of huge slabs of stone similar to those of the megalithic monuments—stone arches, standing stones and the like found in various parts of the world and dating from prehistoric times.

² These corridors, characteristic of the Maltese Neolithic temples, are called "dolmenic" from their structural resemblance to the dolmen. Dolmens, cell-like structures of two, three, or more slabs of stone standing upright and surmounted by a flat stone or "cap-stone," are of frequent occurrence in Malta.

of the megaliths usually surrounds such buildings the entrance of which is found in the middle of a semicircular forecourt. The Tarxien monument consists of three separate buildings raised in succession, though joining each other.

The first temple consisted of two double apses, with a corridor in the middle leading to the north-west to an open space, in which a dolmen stood, probably, against the wall, and to the south-east to an entrance marked by a high threshold. The pillars limiting the corridor are enormous blocks of limestone over 6 feet high, and the apses are made of large hammer-dressed slabs standing erect. The floor is made of a thick

This second temple was made larger than the first, for instead of the usual two oval enclosures it has three, parallel to each other, but decreasing in size from south to north. The oval space to the south is the largest, measuring in length about 60 feet, the next about 40 feet, and the following one about 30 feet. Two short dolmenic corridors connect the three oval chambers. The passage between the first and second oval chambers is barred by a slab on end, about 3 feet high, decorated in front by two symmetrical spirals in relief.

This would show that the use of the two northern chambers was restricted to the priests, who entered



FIG. I.—GENERAL VIEW OF, AND ENTRANCE TO, THE TARXIEN MEGLITHIC TEMPLES, MALTA.

layer of a beaten white, clayey earth over a bed of stones. The apses were originally domed over by layers of masonry consisting of hewn stones.

A small window, between two of the wall slabs of the north-eastern apse, looks into a room which probably was the seat of an oracle. It would seem that the Stone Age people consulted oracles and sooth-sayers very frequently, for similar rooms more or less secluded, with structural features which suggest that they were shut off by a veil, are found in all the Maltese megalithic temples as well as in the Hypogeum, or underground temple, of Hal-Safieni.

Apparently the earliest temple was found insufficient, for a second was built close to it, so close, in fact, that the western apses of the earlier temple were pulled down to make room for a new wall and for a flight of steps to lead into the new building.

*

the holy precincts from a passage to the right of the temple. This passage was reached through a flight of steps wedged in between the walls of the first and second temples. Whilst no sort of decoration appears in the first building, a few carved patterns are met with in the second.

Beside the spirals cut on the slab which obstructs the passage between the first and second compartments, a magnificent scroll pattern is cut on the face of two slabs on end, screening the two apses of the second compartment. The pattern consists of four simple spirals, one at each angle of the slab, with a raised disc in the middle. The spirals, flat and quite smooth, are brought into further relief by a roughened background of circular pittings.

The pitting of stones for decorative purposes is characteristic of the Maltese Stone Age.

Another remarkable feature of this second temple is a small rectangular room on the walls of which two bulls and a sow are carved in low relief. The walls of this room have suffered a good deal by fire, and the stones are, consequently, cracked and flaky, to the



FIG. 2.—SLAB BLOCKING THE PASSAGE TO THE NORTHERN APSES IN THE SECOND TEMPLE AT TARXIEN.

The spirals are simple, and branched off only at one point; they are flat and smooth, thus differing from the spirals of the third temple.

detriment of the carved figures. One of the bulls is badly damaged, but the other one is tolerably well preserved and resembles, in many ways, the animals depicted in the Early Stone Age caves of Dordogne.¹ Below this bull there is a smaller animal, very probably a sow. The outline of this animal is not very clear, but a long row of teats, or very young sucklings, definitely indicate its genus.

In the centre of the two oval chambers, low circular fireplaces are built, which still remain full of ashes; and in a corner of the main entrance a large stone vase, hewn out of a single slab of stone similar to those used in the structure of the building, was found in fragments but has since been repaired.

The third temple is built to the south of the second one, upon one side of which it distinctly encroaches. This fact alone would show that it is a later addition, but one has likewise to note that the plan of the building is inferior in design to the other two, and that there is a great profusion of decoration, nearly every block of stone being ornamented with scrolls in relief.

Three of the rooms of this sanctuary display a

¹ The most important of these caves from an archaeological point of view are situated in the rocks of the valley of the Lower Vézère, Department of Dordogne, South-western France.

charming collection of curved patterns, mostly spirals, simple or branched, single or entwined; some of the patterns are suggestive of thistle leaves, others of goats' horns, whilst on a low step we can see foreshadowed the classical egg-and-tongue ornament.

Four altars in the main hall are carved with graceful scrolls, some of which are in such a low relief as to have the appearance of an inlay broidering the ground. On one of the altars a graceful niche, built of small well-squared slabs, was found standing. The altar under this niche is hollow and has a circular hole at the base deftly plugged by a conical stone of which the surface is so carved as to continue the pattern of the altar face and to disguise the plug.

This cleverly disguised recess was found full of animal bones, the remains of sacrificed animals, mixed with fragments of Neolithic pots; a fine reddish flint sacrificial knife was hidden behind the stone plug.

In this room stood a colossal statue of the deity to whom burnt sacrifices were offered. It is unfortunate that this unique specimen of advanced Neolithic art was not found complete; what remains of it being the legs and a portion of a pleated skirt. It is enough, however, to establish the fact that images were worshipped in the Neolithic Age.

In the same room, in front of one of the altars, a stone vase fixed to the ground must have contained water for ceremonial purification. Close by this vessel there is in the floor a wide circular depression, evidently caused by fire. It was here that a fire was kindled on which the victim, killed by the priest, was roasted or completely burned.

That very choice animals were sacrificed is evident from the masses of bones, mostly charred, that were found in the numerous niches and recesses existing in the building. The bones are of full-sized animals, bulls, goats, sheep, and pigs. Some of the horn-cores of bulls discovered measure over 3 feet in length.



FIG. 3.—NEOLITHIC TYPES OF DECORATED POTTERY, TARXIEN.

Large horn-cores of rams and goats were also found stowed away in closets and niches; all this points to the fact that a portion of the sacrificed animal was deposited as a memento of the offering.

That only certain kinds of animals were used as an offering can be surmised not only from the sacrificial

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remains actually found, but from the representation of such animals carved in two of the rooms of the temple.

The bulls and the pig have already been mentioned ; the other animals are carved on two slabs which formed a kind of dado in a side chapel. One of these friezes represents two rows of eleven goats each. The animals, depicted as in motion, are well drawn and carefully modelled ; they have long curved horns with a backward sweep characteristic of the Persian wild goat. The other frieze shows four goats, a pig and a ram.

important objects discovered, for they show, as no other object would, the high ideal of human nature entertained in the very dawn of civilisation.

The potsherds collected among the Neolithic material are so numerous as to baffle description. There are fragments of pots of every shape and size, rough and polished, plain and decorated, coarse and thin. The majority of the vases display superior workmanship, being gracefully modelled, with a hand-burnished surface in some cases possessing the appearance of enamel. The colour varies from a light fawn to a

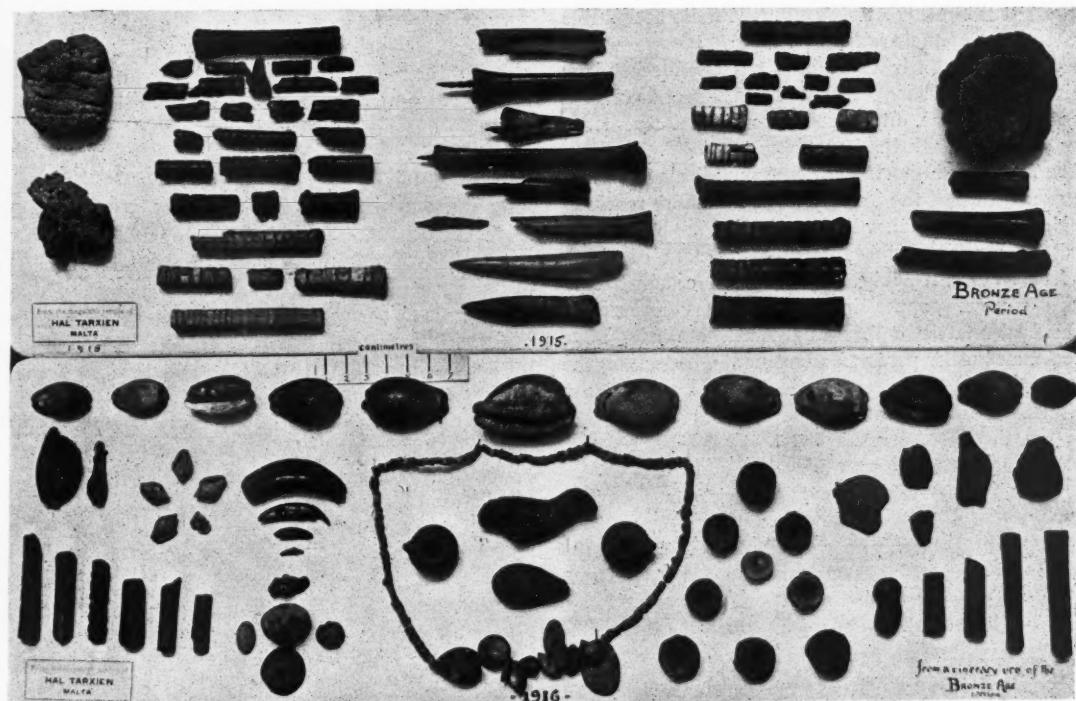


FIG. 4.—BRONZE-AGE OBJECTS FOUND IN CINERARY URNS, HAL TARXIEN.

The foregoing are the main features of the Tarxien temples which have added valuable information to what we already knew about the conditions of life during the Neolithic Age in Malta. The objects discovered in the ruins are hardly less important than the buildings themselves. As one would have expected, stone objects were the more numerous, and included such implements as hammers, mortars, grinders, troughs, and such objects as stone balls, cones of various descriptions, the use of which is not certain, polished stone axes, used probably as amulets, flint and obsidian knives, beads made from marine shells, bone awls, needles, burnishers, etc., all of which were encountered in considerable quantity. Stone statuettes representing human figures are, perhaps, the most

rich brown or a deep black. The plain polished ware is the more common, but decorated pottery was abundant. Fine lines and deep incisions, often filled up with a white or a red paste, decorated the polished surfaces with geometrical patterns ; a peculiar black ware is studded with circular bosses, forming sometimes elaborate scroll patterns, which stand out sharply on a white background. Painted ware has also been found, broad bands of a bright red colour being, in these cases, laid thickly along curved lines.

All these objects point to the long experience of an old race which had lived for a considerable period under peaceful and favourable conditions. From information gained from all the Neolithic stations so far excavated, it appears that the Maltese settlers of the

Stone Age were of an average height, slightly long-headed, possessing regular European features without any trace of prognathism—that projection of the lower part of the face characteristic of a negroid type. A hardy seafaring people, they received their civilisation from the neighbouring continents while maintaining the independence characteristic of an island race. They grew proficient in architecture and handled large blocks of stones with great skill, they were a religious people in the sense that they established a cult, sacrificed animals in honour of a deity, and stowed away, in carefully constructed niches, such portions of the burnt offering as they thought most acceptable to the object of their faith.

They buried their dead and practised secondary burials,¹ when pottery, personal ornaments, and polished axes of greenstone, often broken as a ritual ceremony, were deposited with the bones.

Another very important discovery was made during the excavation of the Tarxien ruins. Before reaching the Neolithic material, which was buried in about 3 feet of silt, the excavators came upon an area of about 25 feet square, thickly covered with crushed clay cinerary urns, copper implements, clay pots, and carbonised matter embedding beads, amulets, bone objects, and other personal adornments, bedecking the deceased at the time of cremation. This was evidently a site for the deposition of cinerary urns by a people who practised cremation. These new-comers reached Tarxien when the temples had collapsed for centuries and when 3 feet of silt had accumulated over the ruins. They were in possession of copper tools and weapons, had a pottery unlike any ware ever met with in the Maltese megalithic buildings, and burned their dead, instead of burying them in earth, as was the custom of the Neolithic people.

These remains of a later civilisation which had reached the Island when the Neolithic sanctuary had been buried for a good number of centuries constituted the first piece of evidence to be brought to light which made it possible to establish a date by comparison with similar remains found elsewhere. No Bronze Age settlements had previously been discovered in Malta, while the peculiar conditions of the discovery furnished clear and unmistakable stratigraphical evidence of the time relation of the Bronze and Neolithic cultures.

The metallic implements are of copper and, therefore, the new-comers can be safely dated to about 2000 B.C., the accepted date of the dawn of the Bronze Age in

¹ "Secondary burial" is a term applied to the practice, prevalent among some primitive peoples, both ancient and modern, of disinterring the bodies of the dead after the flesh has decayed, and then re-burying the bones or disposing of them in other ways, usually after dismemberment.

Europe. If it took ten centuries to cover the ruins of Tarxien with 3 feet of silt, this being the accepted rate of deposit in other Mediterranean islands, one can put the height of the Neolithic civilisation in Malta to about 3000 B.C. This date corresponds to the reckoning obtained by comparing the Maltese Neolithic pottery with other known ware such as that of Egypt and of Crete.

The discovery of a Bronze Age settlement at Tarxien, with a full complement of metallic implements and characteristic pottery, is of vital importance when one comes to consider that such implements and such pottery are not met with anywhere else in these islands. Evidently, the new-comers were not numerous, nor did their customs, such as that of burning the dead, prevail over the early habits of the Maltese population.

Want of sufficient intercourse with continental life has at all times compelled islands to develop on their own lines, hence the length of the Neolithic period in this island.

Although it is quite possible that some knowledge of the Bronze Age culture of Egypt had reached Malta, in the course of time, it had very little influence on the Neolithic culture, which continued to be developed on local lines, as evinced by the pottery and by the stonework.

The duration of the Maltese Stone Age culture is still to be determined, but the lesson learned at Tarxien should always be kept in mind by the archæologist who attempts the solution of the problem—viz., that when the small colony, equipped with the tools and the implements of the early Copper Age, reached Tarxien, the people who had built the temples and carved their friezes had been buried for at least a thousand years.

THE twentieth International Congress of Americanists meets in Rio de Janeiro this month. The purpose of the Congress, which meets biennially, is to afford an opportunity for the discussion of the problems of the ethnology, archæology, and history of the Americas, and as a rule many valuable papers are contributed to the proceedings. The discussions are held in Spanish, French, and English, and the Congress is attended by scientists from all parts of the world, but in particular from the United States and Spanish America. The American School of Archæology in Mexico, the work of which is not sufficiently well known in this country, usually takes a prominent part in the proceedings. It was during the meeting of the Congress in London in 1912, it will be remembered, that the evidence for the existence of tertiary man in South America was thoroughly thrashed out.

The Congress will sit from August 20–30 under the Presidency of Dr. Lauro-Muller, a distinguished Brazilian.

As Brazil is celebrating the Centenary of her independence, and there will be an International Exhibition at Rio, it is hoped that there will be a large and distinguished attendance. The Congress will be followed by a number of excursions to places of interest.

New Light on Ovid's Story of Philemon and Baucis

By W. M. Calder, M.A.

Hulme Professor of Greek in the University of Manchester

ONE of the best-known stories in classical literature is Ovid's charming tale of Philemon and Baucis. It is the story of an aged couple who dwelt among the hills of Phrygia—as the Roman poets were wont to call the interior of Asia Minor. One day two strangers appeared in the district, and begged for food and shelter. After "a thousand doors" had been closed against them, they were taken in by Philemon and Baucis, who set before them a plain but abundant rustic meal, with a treasured chine of pork to crown the fare. Fearful lest this should not be enough, the aged couple decided to offer the guests their gander, the only living creature they possessed. The bird fled, and took refuge with the strangers, whereupon the latter declared themselves to be Jupiter and Mercury. The neighbourhood, said they, must suffer for its sin of inhospitality, and Philemon and Baucis were directed to accompany the gods up the long slope which led to the mountains. When near the top they turned round, and saw the whole valley flooded, except their own dwelling. While they gazed in wonder, their dwelling changed before their eyes into a temple with marble foundations and gilded roof. They were given a wish, and chose to be priest and priestess in the gods' temple, and, even as they had lived in oneness of heart, to die in one and the same hour. In extreme old age they suffered change into an oak and a lime, which are still shown to the visitor, holy trees, surrounded by a low wall and covered with garlands. The teller of the story vouched for its truth; he had himself been to the spot, and had hung fresh garlands on the trees, with a prayer.

This story is told in the eighth book of Ovid's *Metamorphoses*. The work is a collection of stories, loosely strung together, the feature common to them being that they all describe transformations of mythical personages into animals, trees, flowers, rocks, and so forth. In common with the *Fasti*, it illustrates Ovid's interest, and the interest of his readers, in what modern writers call the *etiology* of ritual—the search for an explanation of the religious practices which they saw around them, or in which they took part. This interest was one effect of the religious revival fostered by Augustus, which has left such a deep impress on the literature and monuments of the period. Just as every city had its sacred foundation-legend, so the

explanation of every ritual practice was sought in a story which served as a sort of running commentary on the religious act. The cult was usually traced back to the experiences of some mythical personage; for example the association of Apollo with the laurel was traced back to his love for a maiden called Daphne (Laurel), who fled from his embrace, and was changed into the tree which bore her name.

Ovid was born in the year of Cicero's death, 43 B.C. Between the age of 40 in 3 B.C., and his exile to Tomi in A.D. 9, he was at work on the *Metamorphoses* and the *Fasti*. When he left Rome, the *Metamorphoses* was apparently complete—at least in a first edition; the *Fasti* was certainly not. It would be straining the evidence to argue from this that the *Metamorphoses*, in its totality, was the earlier work of the two, but the balance of probability is that the story with which alone we are concerned was composed about the turn of the centuries. It is not necessary for our purpose to fix an exact date; about 3 B.C. to A.D. 3 is near enough. Ovid must, of course, have been collecting material for the book for some time before he set about its formal composition.

The *ætiological myth*, or foundation-legend, is a universal feature in ancient Mediterranean religion, and the establishment of a city, temple, or cult had always a religious sanction. The foundation of Rome is told, after their respective manners, by Livy and by Vergil; by the historian as well as by the poet it is given a religious setting. Greek literature is full of such legends; the scene which is impressed on the audience before they leave the theatre at the end of Æschylus' *Oresteia* is the foundation of the cult of the Eumenides under the Athenian acropolis; the *Oedipus Coloneus* of Sophocles is a dramatised version of the weird story which was told to explain the cult of Oedipus at Colonus; the *Bacchæ* of Euripides turns on the establishment of the worship of Dionysus at Thebes.

Let us look at Ovid's story of Philemon and Baucis from this point of view. It is professedly a foundation-story, and relates how a particular shrine beside a lake in Asia Minor, in which Jupiter and Mercury were worshipped together, came to be established. Such is the essence of the story, as he who runs reads it. But the story is one of a series which was addressed not only to those who were interested in religious origins, but to a fashionable and flippant public. Add that Ovid was the prince of Roman story-tellers, and that all good story-tellers have a habit of touching up and amplifying their material. The student of ancient religion must accordingly use Ovid's stories with caution; such caution is necessary even in the case of the *Fasti*, which is a more severely technical book than the *Metamorphoses*.

I hope to be able to prove that the story of Philemon

and Baucis is a genuine Anatolian legend, to conduct the reader to the very spot where the legend was originally told, and to indicate the channel through which it reached Ovid in Rome. We shall find that the story contains features derived directly from its Anatolian source. Other features, while germane to Ovid's purpose as a *raconteur*, are without value for the student of ancient religion. Still other features—there are two of them in the story—are of doubtful import. I shall refer to them, but do not find any part of my argument on them.

We may pass over what may be described as mere picturesque detail—the simple, uncomplaining poverty of the old couple, the rustic meal with course after course of country fare, all the details which go to the telling of a good tale—and pass at once to the kernel of religious truth underlying the story. First, there are the sacred trees, covered with garlands, and (do not miss this detail) surrounded by a low wall. How is the sacredness of the trees to be accounted for? For the Anatolian peasant, ancient and modern, such sanctity can only be explained in one way—the spirit of some dead holy man or woman dwells in the trees. Manifestly the sacredness of this oak and lime, standing together, is best explained on the theory that a man and a woman—say, the original priest and priestess of the neighbouring temple—were changed into these trees. The temple itself is of an unusual sort—it is the shrine of two gods, worshipped in common. It stands near a lake, covering what was once habitable land—a sort of Dead Sea, covering the abodes of the wicked. Obviously the two gods were the authors of this local deluge, and we at once, with many analogies in our minds, recognise in Philemon and Baucis the Noah and his wife of a local legend of the flood, the only righteous survivors of a race of sinners overwhelmed in a deluge, meet and acceptable as the priest and priestess in the gods' temple. Next we examine the deluge itself, and we find that it was caused not by rain from heaven, but by water issuing out of the earth. This distinguishes our deluge, which we shall presently find to be of the normal Anatolian type, from the Semitic flood which is described in Genesis, in which the chief stress is laid on the rain from heaven. But surely Ovid will mention an ark? Nothing of the sort—in this version of the deluge the righteous are saved by walking up a hill. All these points are of significance to the student of Anatolian religion. There are two other points, referred to above, on which it would be rash to lay stress—the incident of the gander, and the production by the gods' hosts of a chine of pork. The gander reminds us that the Noah and his wife in many flood legends are associated with birds—in Genesis it is the raven and the dove, in the Chaldaean version it is a variety of birds—and we

wonder whether the gander had not his place in the original legend. But then we reflect that Ovid required a motive for the self-revelation of the gods, and that the gander was a sacred bird at Rome (had he not saved the Capitol in an old cult legend?), and we feel disinclined to press this point. And when we read of the pork, we are reminded that Asia Minor lay as a debatable land between the "pig-eaters of Europe and the pig-haters of the Semitic East," and that tales of old feuds centring round the use of swine flesh were told in the temple-legends of the country. But here again we feel that we cannot press the argument, and we prefer to assume that Ovid regarded a gammon of bacon as an essential course in such a meal as a rustic would offer to an honoured guest.

Having thus cleared the ground, we pass on to consider those features in the story which we have provisionally marked as of Anatolian origin. But before doing so, we must glance at another feature in the story, a feature which it shares, I think, with only one other story in the *Metamorphoses*. The tale of Philemon and Baucis is connected with the preceding story by the flimsiest of devices; as Pichon says, Ovid's transitions from story to story in this work often depend on an accidental turn of phrase, sometimes even on a connecting or adversative particle. In this case, a speaker expresses scepticism regarding the preceding story, and is reproved by the teller of this story, who poses as an eyewitness of the trees, temple, and lake. "I saw the place myself," "Truthful elders, with no motive for deceiving me, told me the tale, and I saw the garlands hanging on the trees," etc. He would be a blind critic who would miss the significance of this feature in the story, shared, I repeat, by only one other story in the *Metamorphoses*, and that story also from the interior of Asia Minor. Ovid is at pains to tell us that his story of Philemon and Baucis is derived from someone who had been to the scene of the legend, and heard it from the lips of the peasants. I may add incidentally that the caution "they had no motive for deception" will be found *passim* in the writings of all moderns whose business it has been to elicit information from the peasants of Anatolia, who can never understand why they are asked for such information by inquisitive strangers from Europe. This trait is as genuinely Anatolian as any in the story.

We see then that Ovid, writing about the turn of the centuries, is telling us the foundation-story of a temple of Jupiter and Mercury beside a lake in Asia Minor, reported by an eyewitness of the locality. The lake occupies ground formerly inhabited: the language used in the poem would suit either a marsh or a lake, but for Asia Minor the distinction is immaterial. In this land of seasonal rainfall, many of the lakes, and even some large ones, are seasonal, and

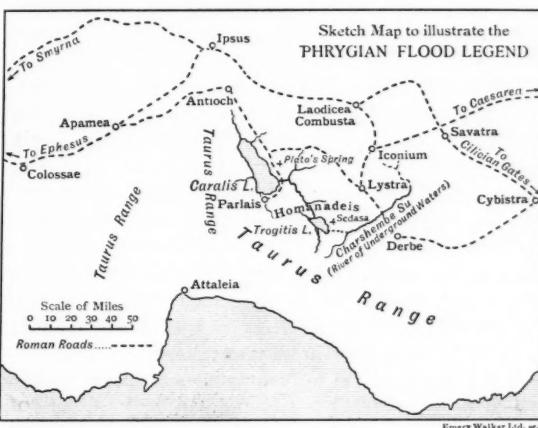
may be called lake or marsh according to the time of year.

Now let us consider the details of religious significance which we have detected in the story. First let us take the sacred trees. On this constant feature of the Anatolian landscape much might be written ; I will content myself with a quotation from a book¹ by a modern traveller which is full of acute observation of the social custom of Asia Minor. My friend Mr. W. J. Childs, describing a tree in the Cilician Gates Pass which was covered over with pious rags and surrounded by a rampart of small stones placed there one by one by Moslem travellers, writes : " These sacred trees . . . are found wherever trees and bushes grow, are decorated always with rags, and surrounded by an accumulation of stones." " The best explanation I got was that these bushes mark the haunt of some dead holy man . . . at which, as at a shrine, offerings might produce lesser miracles, or at least be accounted as good works." Ovid's trees were covered with fillets and surrounded by a low wall. The fundamental things in the old Anatolian religion live on still, and the sacred bushes which every traveller sees in modern Anatolia are good evidence of the Anatolian character of the details recorded by Ovid.

Next let us take the story of the flood. We have noted that the flood in the Philemon and Baucis legend was caused by subterranean water, and that this feature distinguishes it from the Semitic version, in which the principal source of the flood was rain from heaven. The Anatolian versions of the flood legend regularly imply a deluge caused by water issuing out of the earth, as is natural in a volcanic land, where similar phenomena on a smaller scale are of common occurrence. In his story Ovid follows this Anatolian version, and follows it strictly ; and this is a point of some importance, for Ovid was first and foremost a story-teller, with an eye for good copy, and he has a habit of accumulating picturesque detail without much regard to its consistency. This tendency may be observed in another flood story told in the *Metamorphoses*, the Greek version, with Deucalion and Pyrrha playing the part of Noah and his wife. In that story Ovid is manifestly drawing partly on literary sources and partly on his imagination, and here he actually derives his deluge both from heaven and from under the earth. Jupiter first sets the storm-clouds in motion, producing torrents of rain, and then calls on Poseidon to shake the earth and flood the rivers with subterranean waters. The contrast is significant. In the Deucalion story, drawn from literary sources, the Semitic and Phrygian methods are combined to produce a deluge worthy of the occasion. In the Philemon and Baucis story, derived from the truthful

old men who lived near the lake, only the Phrygian method is used.

The Phrygian or Anatolian story of the flood is known chiefly from the legends which two Phrygian cities, Apamea and Iconium, told regarding their origin and early history. Both these cities lie on that somewhat unstable portion of the earth's crust which lines the northern slope of the Taurus range. Here extinct volcanoes, numerous hot springs, and frequent earthquakes reminded the ancient population that they lived in a land where Zeus or Poseidon, if strong to save, was also strong to smite. Of the rivers of Apamea, bursting full-grown from the earth, many strange old tales were told ; it was here that the Sibylline Books located Mount Ararat, identifying it with the mountain overhanging the Marsyas, a river famous in story



Here an abyss opened in the earth, to close again only when the king's son plunged into it, in panoply, on his steed. And here, in later days, we find a legend on the coins of the city which is unexampled in the whole Roman world. Coins struck in the earlier part of the third century of our era represent an ark with a man and a woman in it, and with the name of Noah written on it. Now it is well known that there was a large body of Jews among the citizens of Apamea ; but the same was true of many cities in Asia Minor ; yet it was only at Apamea that the legend of Noah was represented on the coins. The problem was thoroughly investigated by a young Jewish scholar, one of the first French officers to fall in the war, in a book published in 1913,² and he was able to supply convincing proof that the legend of the flood had been located at Apamea from remote antiquity, and that the Jewish version was simply superimposed on the old Anatolian story. The flood-story lasted on in this district till Byzantine times, when, according to the local tradition, a deluge threatened to overwhelm Colossae. The city which had

¹ Across Asia Minor on Foot (Blackwood & Sons, 1918), p. 321.

² Noé Sangariou, by Adolphe Reinach, Paris, 1913.

been specially warned by the Apostle Paul against the worship of angels was on that occasion saved by the archangel Michael, who hacked out the gorge west of the city, and allowed the water to escape. The gorge is there for all to see ; for the Christians it represented the beneficent act of Michael, just as by the pagans it had no doubt been attributed to the trident of Poseidon or the *harpe* of Perseus.

It is, however, with the Iconian version of the flood legend that we are mainly concerned. The Byzantine chroniclers preserve the story of a King Nannakos who ruled at Iconium for 300 years, and foretold a flood which was to overwhelm his people. The flood took place, and the new race was created by Prometheus and Athena out of mud—the *eikones* of mud thus formed giving its name to the city (Eikonion in the Greek version). This is a familiar type of foundation-legend, turning on the name of a city. The evidence for this story is late ; but the recently discovered mimes of Herondas¹ show that the story of Nannakos had become proverbial on the coast of Asia Minor in the third century B.C., and the story in itself has all the marks of great antiquity.

But we are not dependent on the Byzantine chroniclers, or even on Herondas, for proof that the story of the flood had an Iconian version. The myth of a local deluge lingers on in the folk-lore of Iconium till the present day. The Moslems relate that the city was once threatened by a flood from a mountain valley lying to the west, but that Plato (the Arabian counterpart of Virgil the magician) stopped up the hole through which the water passed. And if you visit this valley, you will find a fine fountain issuing from beneath a Hittite monument, and locally known as the "spring of Plato." Plato is simply the Moslem counterpart of the Christian Michael and of the older Perseus, a god who looms large in the early history of this neighbourhood, and who is known elsewhere as a drainer of marshes and a reclaimer of agricultural land.

Iconium lies on the western edge of an arid desert, formed of one of the richest tracts of soil in the Mediterranean area. All the elements of fertility are present in this Lycaonian plain, except water. The district immediately around Iconium is a belt of surpassing fertility—which it owes mainly to a river running down from the Isaurian hills and losing itself in many channels in the plain. An old Arab geographer calls this the River of Underground Waters, and with this description in mind we may ascend the river valley to its source. Here we are confronted by a strange situation.

The water which feeds this river comes mainly from the Taurus range, far to the south. But it is said to

¹ Mime III, l. 10 (Nairn's or Headlam's edition). See also Ramsay, *Cities of St. Paul*, p. 319.

be fed at times also from a lake of peculiar behaviour. This lake, called in ancient times Lake Trogitis, lies at the bottom of a large catchment area, and is separated by a low rim from a canyon which runs down to the River of Underground Waters. Sometimes Lake Trogitis, which is continuously fed by a large stream coming from the larger Lake Caralis, rises sufficiently in height to run over this rim and discharge into the plain of Iconium ; normally it runs off through an underground passage to the south, and occasionally, at long intervals, say the natives, it dries up completely. The engineers of the Baghdad Railway Company diverted the stream which feeds Lake Trogitis into the plain of Iconium, and had actually contracted to drain the greater part of the area covered by the lake. But the lake refused to be drained, and remained obstinately at its old level. Such a body of water as this, behaving capriciously, draining off at will into the plain of Iconium or into the southern sea, rising in level and disappearing as if at the bidding of some unseen power, naturally becomes the focus of strange tales. The few archæologists and other travellers who have visited this lake all record the story told by the natives on its shores, that when at rare intervals the lake dries up completely, an ancient town appears at the bottom.

Here indeed is a lake which might well give rise to such a legend as that told by Ovid—a lake lying in a region from which Iconium folklore brought the Iconian flood, appearing and disappearing mysteriously, covering rich agricultural land, and, according to the local myth, with an ancient town lying in its depths. But is it only a fancy of mine that Ovid's story came from this lake ? It lies in a remote nook in the mountains, far from the great routes of trade and administration which crossed Asia Minor in Ovid's day. Can we claim it as even probable that Ovid had so much as heard of it ?

I have already described in DISCOVERY² what was happening in this region a few years before Ovid wrote the *Metamorphoses*, and while he was collecting the material for his book. Quirinius, the Governor of Syria mentioned by Luke in the passage in which he dates the birth of Christ, was engaged between 11 and 6 B.C. in a war for the pacification of Pisidia, which, from the name of the tribe which was the principal enemy and gave most trouble to the Roman army, was called the Homanadensian War. The war was a success for the Roman arms. Only two facts concerning it need be repeated here. It was over in 6 B.C., and the principal scene of operations was the country round Lake Trogitis, the home of the Homanadeis. Quirinius, as Strabo and Pliny inform us, reduced their fastnesses one by one, took 6,000 men alive, and

² April 1920, pp. 100 ff.

planted them in the neighbouring cities. Clearly his army got to know the valley of Lake Trogitis very thoroughly. About 6 B.C. Quirinius returned to Rome, where he was honoured as a conqueror, and no doubt many of his officers accompanied him. Ovid, who moved in the best society, would have ample opportunity of hearing the story of Lake Trogitis.

Strangely enough, we can prove a good knowledge of the topography of Lake Trogitis in the case of at least one Roman officer. It has always puzzled those students of Strabo who know the country he is describing that he twice makes reference to Lake Trogitis, without being aware that on both occasions he is referring to the same lake. Strabo travelled widely in Asia Minor, and in the first of the two passages he lets fall a hint which shows us the route by which he crossed Lycaonia. He mentions the city Savatra, where the wells are so deep that you buy water at so much a bucket, and the sheep are fat and fleecy—obviously an eyewitness account, proving that he had passed by Savatra, and therefore along the northern branch of the Syrian Highway, which does not touch Iconium. But he is quite explicit on the point himself. He goes on to say, "and in that region lie Lakes Caralis and Trogitis, and somewhere hereabouts Iconium"—evidently he had not been to Iconium or the lakes. Now this is strange, for a few pages farther on he gives us an admirably exact description of the military topography of the valley of Trogitis. He is now describing the Homanadensian War, and says that it was fought in a region of crags and precipices surrounding a fertile plain, divided into several canyons, and defended on all sides by mountains. This is obviously the description of a military eyewitness, and Ramsay acutely discerned that Strabo got it from one of Quirinius' officers, and used it without being aware that it referred to Lake Trogitis which he had already mentioned.

If information regarding Lake Trogitis was accessible to Strabo (wherever he wrote; there is doubt on the point), it was accessible to Ovid in Rome when he was collecting materials for his *Metamorphoses*. We have now seen that Lake Trogitis—that mysterious lake which accords so well with Ovid's story—was the one lake in Asia Minor which is certain to have been much talked of in Rome after the year 6 B.C. And we have seen that Ovid's story of Philemon and Baucis—an eyewitness story—is a genuine Anatolian legend, answering to every test of local veracity that we can apply to it. I venture to think that few cases which have been made out for an ancient literary origin are more substantial.

But this is not all. So far I have set out the case for the location of Ovid's legend at Lake Trogitis as it can be established by independent witnesses. One

day in 1909 our party visited the lake, and in the evening (to avoid the mosquitoes) we rode up the long slope to the high ledge which overlooks the lake on the east. By such trivial considerations is discovery often guided. We passed the night in a village which had already been visited by the American Sterrett, who found evidence that it was one of the villages of the Homanadeis, called Sedasa. Near Sedasa we were fortunate enough to find an inscription which told us that on this ledge, in the Greek and Roman periods, there had stood a temple of Jupiter and Mercury.¹

The writer's realisation of the bearing of this discovery on Ovid's story has followed from Ramsay's² brilliant reconstruction of the topography of the Homanadensian War, recently published. Its bearing on another story told of this neighbourhood was plain to us at once. One of the series of garrison cities founded by Quirinius to control the Pisidians, and the nearest of the whole series to Lake Trogitis, was Lystra. Lystra was visited some fifty years later by Paul and Barnabas, and there Paul healed a lame man. "And when the people saw what Paul had done, they lifted up their voices, saying in the speech of Lycaonia, The gods are come down to us in the likeness of men. And they called Barnabas Jupiter, and Paul Mercurius."

For the story of Philemon and Baucis see Ovid's *Metamorphoses*, viii, ll. 611–724; trans. by F. J. Miller in the Loeb Classics. (Heinemann.)

The British Association A Retrospect³

To many people the British Association still conjures up an image of the tame scientist, a curious kind of fellow who may be suffered to live, but who in life may be safely ignored. It is well known that this is no longer a true image, but once it was; and it exists to-day because it is an inheritance of the past. In 1831 when the British Association was founded the scientist was indeed a tame scientist, a harmless curiosity, not only in England but wherever he flourished. A remark by a lounging in a Hamburg café in 1830 that a scientist was passing up the street led to an animated scene of which we have a record. Immediately after it was made there was a "hustling and a jostling, a knocking over of chairs and tables, and a scrambling for hats, as everyone hurried to the door to see what the animal was like, and if it walked

¹ Published by the writer in *Classical Review*, 1910, pp. 76 ff., and *Expositor*, July 1910, pp. 1 ff.

² *Journal of Roman Studies*, vii, pp. 229 ff.

³ *The British Association for the Advancement of Science. A Retrospect, 1831–1921*. By O. J. R. Howarth, O.B.E., M.A. (London: The British Association, 7s. 6d.)

on two legs or four on its way up the street." But even worse than to be regarded with curiosity or contempt is to be ignored altogether. "There is not at this moment, within the British Isles," complained Sir David Brewster in 1830, "a single scientist, however eminent have been his services, who bears the lowest title that is given to the lowest benefactor of the nation, or to the humblest servant of the Crown!" This was true enough if we consider James Watt, not, however, if we consider Sir David himself. Yet things were bad for scientists in those days. For them no pensions, allowances, or sinecures; no favours from the sovereign, no friendships with his ministers. Recognition, power, fame were still to come; the Orders of Merit and of the British Empire had still to be instituted; not then was that home of science, Cambridge, a beknighted city.

The British Association was founded to better this wretched condition. Its founders were Sir David Brewster, John Phillips the geologist, and the Rev. W. Vernon Harcourt, chemist and Canon of York. Its object was to advance science by giving a stronger impulse and more systematic direction to scientific inquiry, to obtain a greater degree of national attention to the objects of science, and to promote the intercourse of the cultivators of science with one another and with those from abroad. To the first meeting, held in York under the presidency of Lord Milton, afterwards the third Earl Fitzwilliam, came 200 friends of science. The early meetings became at once successful. Dalton attended. Cambridge sent Sedgwick, Airy, Herschel, Babbage, and Lubbock; London, Faraday, Owen, Wheatstone, and Lyell. From Ireland came Lord Rosse and Sir William Hamilton, and, from the Continent, Bessel, Liebig, Leverrier, and Jacobi. The meetings were originally for men only. It was thought that if ladies were admitted to any of the scientific discussions the proceedings would lose their real value and degenerate—"especially in a place like Oxford—into a sort of Albemarle-dilettanti meeting."

The York meeting was a great success and the Association found its feet at once. There was, however, opposition to be encountered and quashed. Some did not like the rule that the annual meetings be held only in the provinces; some thought the Association was being used by its founders to advertise themselves unnecessarily; others were simply shy. Lockhart of the *Quarterly Review*, and even Charles Dickens attacked it. Many sneering and pseudo-scientific humbugs maligned it. *The Times* showed uncompromising hostility. When the Association held its second meeting in 1832 at Oxford the honorary degree of D.C.L. was bestowed upon some of the most distinguished members of the Association. Yet

Keble, at that time a leader of university thought, found time to write, "The Oxford Doctors have truckled sadly to the spirit of the times in receiving the hodgepodge of philosophers as they did." The hodge-podge of philosophers were Robert Brown (of the Brownian movement), Sir David Brewster, Michael Faraday, and John Dalton, great scientists all!

But none of these things worried the Association much. Slowly it grew in numbers, repute, and power. In 1833 there were four sections, in 1836 seven; today there are thirteen. Geography became a separate section in 1851, anthropology in 1884, physiology in 1893, educational science in 1901, agriculture in 1912, and psychology in 1921. There is no record of a section once formed being afterwards disbanded, and though some were objected to at the time of their formation, all have eventually justified their establishment. Another thing illustrative of the Association's power and influence is the number of smaller scientific societies to which it has given birth. Important and flourishing societies in Edinburgh, Glasgow, Birmingham, Norwich, Bradford, Southampton, and Aberdeen were founded as a result of, and soon after, the meetings of the Association in those cities.

A feature of the British Association has been the overseas meetings. The first of these was held in Montreal in 1884. An American Association for the Advancement of Science had been founded in 1848 on the lines of the British one. This society met in Montreal in 1882 and to it they invited British scientific men, offering many inducements, but the response was very poor. Yet it helped to popularise the suggestion of holding a meeting outside England. Opposition, however, was strong. Why should eminent scientists travel across the Atlantic to visit a land not great in science? It could only be because they regarded the trip as a picnic, or because they could add to the joy of an agreeable outing the pleasure of showing off or of being wondered at. The Canadians, some of them at least, were also dubious. They foresaw audiences small and uninspired: "the mind of the average fashionable gathering is not scientific; it is not even literary in the most meagre sense; it very hazily comprehends Oscar Wilde; it fails to grasp Professor Tyndall or Professor Huxley." Nevertheless the Association went overseas more than nine hundred strong; they saw and conquered. The whole adventure was a great success. Numerous excursions were arranged; the American Association was invited to Montreal, and it invited the British Association to Philadelphia; everybody was pleased, and even some scientific work was done. Since then the Association has crossed the sea four times: to Toronto in 1897, to South Africa in 1905, to Winnipeg in 1909, and to Australia in 1914. All of these meetings have been

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successful, and the most popular of all was the Australian meeting in 1914.

The meetings of the British Association have been the scene of many famous discussions. New theories or discoveries have rarely been disclosed for the first time at these meetings, but often they have been announced there for the first time in a popular or semi-popular form, or described for the first time so that discussion is possible. In that age—"so rich in minds of the first order in science . . . the golden age, not of art or of poetry, not of drama or of adventure, but of science . . . an epoch distinguished by a galaxy of men who made it great, and who, whether the world recognised it or not, were great men" (as Silvanus Thompson described it)—discoveries were innumerable and a few of them only can be singled out here. In 1860 at Oxford there was the famous discussion on Darwin's *Origin of Species*, in which occurred Huxley's retort to Bishop Wilberforce of which every book that describes it gives a different version. In 1877 at Plymouth Sir William Preece demonstrated various types of the newly-invented telephone. In 1888 at Bath Fitzgerald announced Hertz's verification of Clerk Maxwell's theory of electro-magnetic waves. In 1894 at Oxford Ramsay described the isolation of the new gas argon, and at the same meeting Sir Oliver Lodge gave one of the earliest demonstrations of wireless. At Dover in 1899 Sir Joseph Thomson described "the existence of masses smaller than the atoms"—the electrons. At Leicester in 1907 Duddell, in giving an evening lecture on the arc and spark in radio-telegraphy, showed experiments which formed the foundation for continuous-wave telegraphy. At the Oxford meeting in 1894 there was a discussion on Maxim's flying machine, and it is interesting to note that this early example of the aeroplane was then described by Lord Kelvin as "a kind of child's perambulator with a sunshade magnified eight times." Two recent discussions of outstanding importance were that on the Constitution of the Atom, opened by Sir Ernest Rutherford at Leicester in 1907, and that on the Age of the Earth opened at Edinburgh last year by Lord Rayleigh.

The public lectures also have been an important feature of the Association's meetings. These were given by scientists not to fellow-scientists, but to the general public or to working-men. One of the earliest of these was given away back in 1838, by Adam Sedgwick, the geologist, at the meeting at Newcastle, and is described by Sir John Herschel in a letter as follows:

"But this was nothing compared to an out-of-door speech, address, or lecture, which Sedgwick read on the sea-beach at Tynemouth to some 3,000 or 4,000 colliers, . . . which has produced a sensation as is

not likely to die away for years. I am told by ear- and eye-witnesses that it is impossible to conceive the sublimity of the scene, as he stood on the point of a rock a little raised, to which he rushed as if by a sudden impulse, and led them on from the scene around them to the wonders of the coal-country below them, thence to the economy of a coal-field, thence to their relations with the coal-owners and capitalists, then to the great principles of morality . . . and happiness and their own future prospects. . . ."

For these lectures, of course, the very best men were selected, for if there are few things better than a scientific lecture given by a man who says exactly what he means, without confusion and without obscurity, and saying neither too much nor too little, there are few things worse than the opposite. Tyndall started the series in 1867 with a lecture on "Matter and Force," Huxley following with "A Piece of Chalk." Silvanus Thompson was a past master at this work. In 1891 at Cardiff he spoke on the uses of electricity in mining to a crowded audience of miners who were brought by special trains to hear him speak; again at Bradford he spoke to an audience of 3,500 for an hour and three-quarters, discussing the applications of electricity to industry as a national question, and at the close elicited a "manifestation of feeling . . . such as is generally associated with a great political meeting, rather than with a scientific lecture." The popular lectures to the public are nowadays one of the most delightful of the Association's activities, and one of the best means of securing one part of the Association's object.

Mr. Howarth's book, from which the description above has chiefly been obtained, is an exceedingly interesting and informed account of the British Association's activities during the past ninety years. The author, as secretary of the Association, has been enabled to write from inside information. In addition to accounts of the history and organisation of the Association and the progress of science, the book contains chapters dealing with the Association and research, the Association and the state, a description of some Association researches, and a discussion of its present position, work, and prospects. There are appendices showing the grants paid by the Association in aid of research, and giving the dates and places of the annual meetings with biographical notes of presidents and other prominent members. The illustrations are a feature, and these include photographs of eleven great scientists: Brewster, Vernon Harcourt, Phillips, Murchison, Huxley, Tyndall, Sedgwick, Whewell, Kelvin, Crookes, and Rayleigh. We like best those of Phillips in his old-time Pickwickian costume, of Whewell, big and dour, almost a cross between Beethoven and Liszt, and of Kelvin, gentle and serene,

like a retired Clyde-steamer captain about to fill his second pipe.

The book is altogether a good one, and should be welcomed by everyone who is privileged to take an interest in science.

In talking of the British Association's past we need not forget it has a future too. In 1924 it hopes to meet in Canada. This year it meets in Hull. It met there once before, in 1853, with Hopkins the geologist as president. This time Sir Charles Sherrington is in the chair. His subject will be "Some Aspects of Mechanism." Several of the addresses of the sectional presidents will deal, as befits a meeting in Hull, with North Sea problems. Among the subjects of joint discussion will be "The Origin of Magnetism," "Psycho-analysis and the School," "Mental Characters and Race," "The Present Position of Darwinism," and "The Possibility of Increasing the Food Supply of Great Britain." Dr. F. W. Aston will give an evening discourse on "The Atoms of Matter," and Prof. W. Garstang one on "Fishing: Old and New."

A. S. RUSSELL.

Modern Road-making in Cities

By George Whale

THE enormous increase in the weight of vehicular traffic during the last ten years has awakened those responsible for the maintenance and construction of roads, both in the cities and the country, to the fact that new methods must be adopted to meet the altered conditions. Owing to the weight of the motor-omnibus, the motor lorry and steam wagon now universal in road transport, a good foundation and a solid one is absolutely essential. In the cities, therefore, cement concrete foundations are laid in all main thoroughfares which are paved with wood blocks, granite setts, or one of the various forms of asphalt, of which there are several to choose from.

Of these three types of paving the granite setts are the most durable, but they are extremely noisy and ill adapted for any streets except those in the vicinity of docks or warehouses. Wood paving compares very favourably with other types. It is easily cleaned and is practically non-absorbent, and traffic over it is more silent. It has a lengthy life and requires little or no repairs for several years. As compared with asphalt it is slightly inferior from a sanitary point of view and a little less silent, but on the other hand affords a much better foothold for horses and, if it is properly cleansed, vehicles are less likely to

skid on it. For these reasons wood paving finds most favour with municipal engineers and is in general use in the principal carriageways of London and other large cities.

The work of repaving a carriageway with wood is one of considerable magnitude. The old blocks have to be stripped and taken away and the old concrete foundation broken up and removed. In its place a new concrete foundation is laid, 12 in. deep for heavy traffic and 9 in. deep for moderate traffic. Experiments are also being conducted in introducing metal reinforcing, which reduces the thickness of concrete required. The concrete foundations in the best class of work are composed of clean sharp ballast or crushed concrete and Portland cement mixed in a proportion of 6 to 1.

Until quite recently all this work was carried out by hand labour, but to-day several of the municipal boroughs of London are employing concrete mixing machines which, besides executing the work in a much better manner, effect a considerable saving in labour. These mixing machines move under their own power and require a complement of fifteen men. They are capable of spreading as much in one day as would be carried out by sixty men mixing concrete by hand.

The crushing machine, which is employed in crushing the best of the old concrete that has been broken out, is also a source of economy. On several road works carried out recently about 50 per cent. of new ballast was saved by using old crushed concrete, and a similar saving in carting away of old material was accordingly secured. On the top of the concrete foundation is laid an average depth of 1 in. of fine cement concrete, known as "floating," to afford a smooth and level bed for the wood blocks. This "floating," composed of clean sand and cement in proportions of 3 to 1, is also mixed by a light portable mixing machine.

The wood paving blocks are usually specified to be of the best Swedish yellow deal and to be cut from 3 by 9 in. planks. They are 8 in. or 9 in. long, 3 in. wide, and 4 to 5 in. deep. The blocks are placed in a cylinder, which is raised to a temperature of 200 degrees Fahrenheit. The steam is exhausted from the cylinder by means of an air pump, and creosote is forced into the blocks at a pressure of not less than 120 lb. to the square inch and to an amount of not less than 8 lb. to each cubic foot of timber. The blocks when laid are thoroughly "grouted" with pitch and creosote oil mixed in proportions of 8 to 1 and then washed over with liquid cement. Finally they are covered with $\frac{1}{2}$ in. of crushed shingle, and the road is then ready to be reopened for traffic.

Even with the introduction of machinery wood paving renewals are a costly business, and the esti-

mated cost of such works for the present year is about £2 15s. per square yard. Labour, so much of which has to be devoted to the breaking out of the old concrete, absorbs much of this cost. The breaking out is still done by hand to find work for unemployed men. When labour conditions have settled down, we may expect this portion of the work to be done by mechanical drills, and a further considerable saving in expenditure may be looked for.

The life of a wood carriageway is from twelve to fifteen years under heavy traffic conditions and from eighteen to twenty years under moderate traffic, but it is anticipated that the actual modern foundations themselves will last very much longer. Periodically the wood blocks and the "floating" will require renewal, but this is an inexpensive business compared with relaying the foundation.

Considerable trouble has been taken of late years in adopting the best gradients and transverse inclinations, so as to afford ample opportunity for drainage and yet avoid undue cause for the skidding of heavy vehicles. A complete survey is now made of any road under order for reconstruction, and levels are taken to enable the new contours to be calculated. These, when completed, are set out scientifically, and the results may be said to justify the expenditure of time and trouble.

Minor thoroughfares are now paved for the most part with tar macadam or one of the bituminous macadams, of which there are so many on the market. In these works the foundation is composed of hardcore well rolled, and the tar or bituminous macadam coatings are spread in two layers, the bottom of coarse, the top of finer material, each well rolled and formed to gradients.

Experiments have been conducted also with roads composed entirely of concrete, but so far they have not been entirely satisfactory.

The main difficulty experienced in London is that no street remains in an undisturbed condition for any length of time. Water, gas, hydraulic mains, Post Office and electric lighting cables—all are laid indiscriminately beneath the surface. They are continually in need of repair, and, to effect this, the road is broken up and the continuity of its foundations impoverished. If it were possible to lay all these mains in a subway, there is no reason why the road foundations of to-day should not last a hundred years.

The Metropolitan Paving Committee recently issued its annual report, which showed that all the boroughs are working on more or less similar lines to those outlined above. Vehicles, however, seem to grow heavier day by day, and it may be doubted if even the methods at present in use will prove to be sufficient for very long.

The Fate of a Great Lyric Poet

II

By Edward Liveing, B.A.

(Continued from July No., p. 188)

VI

THE true details of Shelley's death and the sinking of the *Ariel* will never be known. Various theories have been put forward. I propose to amplify one of those theories, but before proceeding to do this it would be as well to return to Roberts and Trelawny. Roberts, as we have already noted, kept the boat in view till it was "off Via Reggio, at some distance from shore, when a storm was driven over the sea. It enveloped them and several larger vessels in the darkness. When the cloud passed onwards, Roberts looked again, and saw every other vessel sailing on the ocean except their little schooner, which had vanished."¹ The storm-cloud broke over Leghorn about half-past six, according to Trelawny.² The storm lasted about twenty minutes. After it had passed over he "looked to seaward anxiously in the hope of descrying Shelley's boat amongst the many small craft scattered about. I watched every speck that loomed on the horizon, thinking that they would have borne up on their return to port, as all the other boats that had gone out in the same direction had done."

The only facts which are at all certain are that the *Ariel* perished during, roughly, a twenty minutes' storm, some time between four and five o'clock in the afternoon of July 8th, about ten miles off Via Reggio. Now let us consider the theories of the disaster, which may be conveniently summarised as follows:

- (a) The boat merely sank in the storm.
- (b) It was accidentally rammed by one of the Genoese fishing boats.

- (c) It was intentionally rammed.

We can dismiss (a) without more ado, since evidence in support of (b) at least is to-day so strong that, I imagine, no modern student would believe that the accident was entirely accounted for by the storm. While Trelawny was at Rome, burying Shelley's ashes in the Protestant cemetery there, Roberts concerned himself with recovering the *Ariel*. According to Trelawny the two *felucche*, which he had hitherto employed on the salvage operations, had found the boat, but failed to raise her. In September Roberts³ wrote to Trelawny from Pisa, "We have got fast hold of Shelley's boat, and she is now safe at anchor off

¹ Ref. IV. P. 673.

² Ref. V. Pp. 107-108.

³ Ref. V. P. 150.

Via Reggio." Dr. Biagi's¹ investigations in 1890 have put beyond doubt that the *Ariel* was found and towed into port by two fishing-smacks belonging to a certain Signor Stefano Baroni of Via Reggio. On September 18th Roberts again wrote to Trelawny, and his letter shows that he had begun to consider that the *Ariel* had been run down. The two masts had been carried away, the bowsprit broken off close to the bows, and the gunwale stove in. But further examination brought to light more tell-tale evidence—many of the timbers on the starboard quarter had been broken. Roberts' belief that "she must have been run down by some of the feluccas in the squall" was shared at the time by most persons who saw the salvaged boat. Mrs. Shelley wrote to a friend on May 3rd, 1823²:

"It is plain to every eye she was run down from behind. On bringing her up from fifteen fathoms, all was in her—books, telescope, ballast—lying on each side of the boat without any appearance of shifting or confusion; the topsails furled, topmast lowered; the false stern . . . broken to pieces, and a great hole knocked in the stern timbers. When she was brought to Leghorn, everyone went to see her, and the same exclamation was uttered by all, 'She was run down'—by that wretched fishing-boat, which owned that it had seen them."

Later biographers have been uncertain as to whether the *Ariel* was rammed at all. Dr. Garnett³ concluded that "the collision, if collision there was, was accidental"; Prof. Dowden preferred to pronounce no definite verdict on the subject; Dr. Biagi agreed with Garnett that the storm would have rendered any intentional running-down impossible, but he definitely concluded that the boat was accidentally rammed. That the boat was not merely sunk by the storm there seems on the whole to be little doubt, and we will now look at further evidence which does not only support this conclusion but leads to the third theory, that the *Ariel* was rammed intentionally.

¹ Ref. I. He gives an extract from the Royal State Archives of Lucca, Home Affairs, 1822, No. 95, Duchy of Lucca (letter of Governor of City of Via Reggio to Secretary of State for Home and Foreign Affairs, Lucca): "The two fishing-smacks belonging to Sig. Stefano Baroni of Via Reggio have, while fishing, discovered at the bottom of the sea, at the distance of about fifteen miles from shore, a small vessel, schooner rigged. . . . They arrived (at Via Reggio) towards noon this morning." Also one of the eight natives of Via Reggio, whose knowledge of the disaster Biagi examined in August 1890, stated that "he belonged to the crew of Baroni's *paranzelle*, commanded by Giampieri, who recovered the schooner in the roads at Via Reggio, precisely five miles out, in the direction of the Tower of Migliarino. The schooner caught in their net," and they towed her westward and beached and bailed her. They afterwards towed her into Leghorn.

² Letter from Albaro to Mrs. Gisborne.

³ In his article, "Shelley's Last Days," quoted by Dowden.

Now, on the day following the disaster, Trelawny⁴ and his Genoese mate examined as carefully as they could the crews and boats that had returned to harbour. The mate noticed on board a fishing-boat "an English-made oar that he thought he had seen in Shelley's boat." The crew flatly denied this. Their obvious reason for doing so was, as Trelawny indicated, the fear of the quarantine laws, then so strict, that "when at sea, if you render assistance to a vessel in distress, or rescue a drowning stranger, on returning to port you are condemned to a long and rigorous quarantine of fourteen or more days." So, even if they had rammed the boat accidentally, they would have wished to conceal the fact. The Genoese mate held suspicions as to the veracity of the crew, and he must have had a thorough knowledge of the psychology of the seamen of his own coast.

Apparently, however, the captain of the felucca asserted that he had seen Shelley's boat "go down off Via Reggio, with all sail set" (Trelawny, p. 117). Also "when the *Bolivar* arrived off Via Reggio on August 14th, she fell in with two small vessels hired by Trelawny at Leghorn for the purpose of ascertaining, by the means used to recover vessels, the spot at which Shelley's boat had foundered. They had on board the captain of a felucca in which Roberts had observed several spars belonging to the *Ariel*. The captain declared that he had seen the *Ariel* at the moment of her disappearance; it was four in the afternoon, the boy was at masthead, when thwart winds struck the sails; they had looked away for an instant, and looking again the boat was gone. They could not, said the captain, get near her, and passing three-quarters of an hour later over the spot where they had seen her, no wreck was visible."⁵ It was this man apparently who conducted the dredging operations between August 13th and 19th, and eventually reported that he had "succeeded in finding her, but failed in getting her up."⁶

Trelawny was too occupied during this time with the cremation of his friends' bodies and the official formalities connected therewith to be able to do more than rely on this man's statements. Immediately afterwards he proceeded to Rome, as we have seen, and entrusted the salvaging of the boat to Roberts. As we have also seen, the boat was eventually found accidentally and salvaged by two fishing-smacks belonging to Signor Stefano Baroni—and it was found about fifteen miles out, not two. In fact, Trelawny's account of the attempts to recover the boat has the inevitable inaccuracies of a man who was not on the spot, and it is noteworthy that as late as 1875⁷ he still entertained

⁴ Ref. V. Pp. 108–117.

⁵ Ref. V. P. 117.

⁶ Ref. II. Pp. 579–580.

⁷ Ref. V. P. 116.

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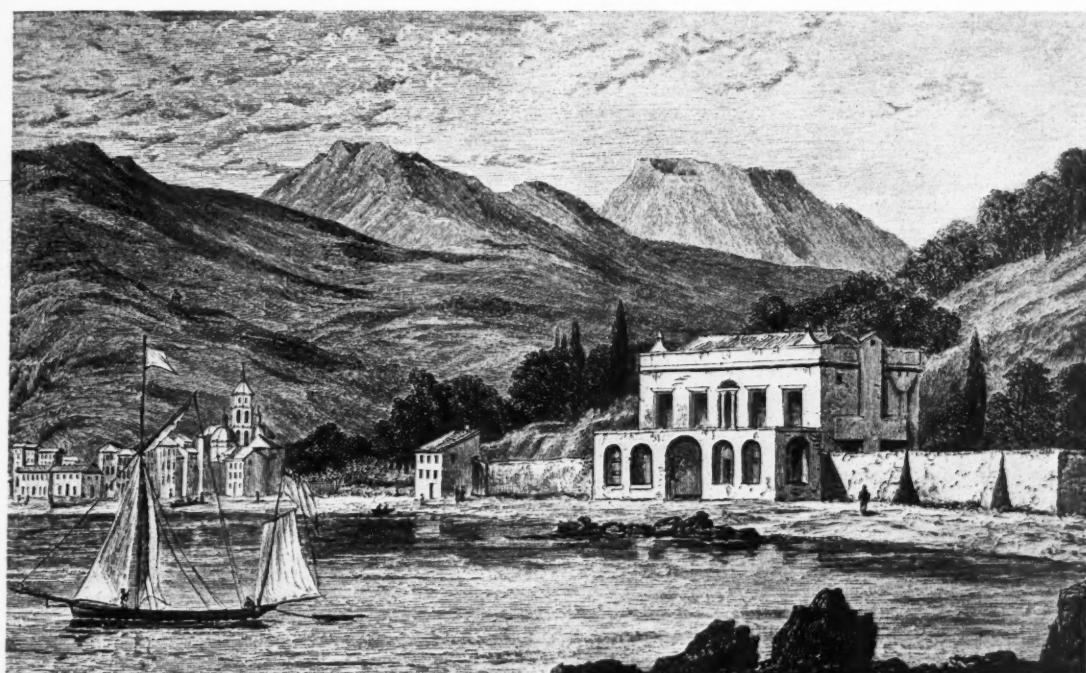
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the
believe that the *Ariel* was found only two miles out from Via Reggio. Who put this idea into his head? As I see the matter, none other than this man who was in charge of the dredging operations till Trelawny departed for Rome, the captain, apparently, of the felucca in which both Roberts and Trelawny's mate had observed several spars belonging to the *Ariel*. The question which one naturally asks is, "Why did this man report that he had found the boat only two miles from shore, but could not get her up?" And the answer which arises in one's mind is, "Because he realised that its broken timbers would serve as a

daughter wrote to him from Rome on November 22nd, that "a little while ago there died at Spezzia an old sailor, who, in his last confessions to the priest (whom he told to make it public), stated that he was one of the crew that ran down the boat containing Shelley and Williams which was done under the impression that the rich 'milord Byron' was on board with lots of money.

"They did not intend to sink the boat, but to board her and murder Byron. She sank, he said, as soon as she was struck."

Miss Trelawny's letter was published in *The Times*,



THE CASA MAGNI IN 1822, WITH THE BOAT (THE ARIEL) IN WHICH SHELLEY WAS DROWNED.
From a drawing by Captain D. Roberts, who built the "Ariel."

witness against him, and that, therefore, any subsequent search-parties must be misled."

Before proceeding, I must say that this is a conjecture of which I am by no means certain, and, even if we dismiss it, this does not affect the other arguments that the *Ariel* was run down intentionally. Even at the time of the disaster, as Leigh Hunt¹ wrote, "a suspicion was not wanting that the boat had been run down by a larger one with a view to plunder it. Mr. Shelley was known to have taken money on board. Crimes of that nature had occurred often enough to warrant such a suspicion." This view of the case received further support in 1875, when Trelawny's²

and a violent correspondence ensued. Sir Vincent Eyre wrote (December 28th) that he had been given the version of this boatman's confession (made in 1863) as it had been handed on by the priest to an Italian nobleman and by the latter to his friend with whom he (Eyre) had earlier in 1875 been staying in the Bay of Spezia: "A boatman dying near Sarzana confessed, about twelve years ago, that he was one of five who, seeing the English boat in great danger, ran her down, thinking Milord Inglese was on board, and they should find gold."

Trelawny's suspicions of foul play were confirmed by this letter from his daughter. His letter to *The Times* (December 27th) contains two interesting state-

¹ Ref. III.

² Ref. V. Pp. 112-117.

ments; not before made by him: (1) "Two feluccas went out of port at the same time, in the same direction as Shelley's boat." (2) "Her starboard quarter was stove in, evidently by a blow from the sharp bows of a felucca, and, as I have said, being undocked and having three tons and a half of iron ballast, she would have sunk in two minutes." Also in an Appendix to his *Records*¹ he gives explicitly his belief as to the intentions of the crew who ran down the boat: "They knew there would be a squall; in that squall they would run down the 'Don Juan' [the original name for the *Ariel*], drown the three people on board, and get the bag of dollars which they had seen taken on board. That was what tempted them. They succeeded in all but the last part; the boat's sinking so suddenly defeated their getting the money."

In the first instalment of this article I carefully mentioned the matter of Shelley's cashing £50, lent him by Byron, at Messrs. Webb and Barry's. He took it down to the boat in a canvas bag. "Byron, Shelley, Williams, and myself could not be distinguished by the sailors at the harbour," says Trelawny,² "and Byron's and Shelley's boats had their sails loose ready for sea."

Taking all the evidence into account, I am inclined to think that one of the two boats, which put to sea at the same time as the *Ariel*, rammed her in the belief that Byron was on board with the money seen either being cashed at the bank or taken down to the boat.

Or was the plot thicker than this? Byron had many enemies along the coast. In particular there was Masi, the affray with whom, on March 24th, I dealt with at some length in the first instalment, and who had sworn to have vengeance for his serious injuries. The questions naturally arise, "Did this man have a friend at Messrs. Webb and Barry's?" or, "Might not he or one of his friends have suggested to the captain of one of the two feluccas that, if he ran down the *Ariel* in the storm that was brewing, he would find a good prize on board?" I will not press this supposition further than recalling that—

(a) Masi had vowed vengeance not only on Byron, but on Shelley, and all the members of the "pistol party."

(b) He was a dogged type of individual whose plans of revenge were not likely to have cooled down within three months.

(c) Miss Trelawny's version of the old sailor's confession contains the sentence, "They did not intend to sink the boat, but to board her and murder Byron." Why did they wish to murder Byron in particular, when they obviously must have known or believed that he was not the only "Inglese" on board? Why is the word "murder" used in this version (*assassinare*, I take it, rather than *ammazzare*)?

¹ Ref. V. Pp. 263-264.

² Ref. V. P. 115.

Shelley's body was thrown up on the Tuscan shore, near Via Reggio. It was found on July 16th or 17th. The tall slight figure, the volume of Sophocles in one pocket of the jacket and in the other the last volume of Keats's poems lately lent him by Hunt "doubled back as if the reader, in the act of reading, had hastily thrust it away," left no doubt in Trelawny's mind as to its identity, though the sea had already done its work.

(Concluded)

REFERENCES

- I. Biagi, Dr. Guido. *The Last Days of Percy Bysshe Shelley*. (T. Fisher Unwin, 1898.)
- II. Dowden, Edward. *The Life of Percy Bysshe Shelley*. Chapters XXIII and XXIV. (New and abridged edition, Kegan Paul, Trench, Trübner & Co., Ltd., 1920.) For the details of Shelley's last days the new edition is as serviceable as the two-volume 1886 edition. This admirable work still remains the standard biography.
- III. Leigh Hunt. *The Autobiography of*. (Smith Elder & Co., Ltd.)
- IV. Shelley. *The Complete Poetical Works of*. Edited by Thomas Hutchinson, M.A., and including Mary Shelley's notes. (Oxford Edition. Henry Frowde: Oxford University Press.)
- V. Trelawny, E. J. *Records of Shelley, Byron, and the Author*. (George Routledge & Sons, Ltd., The New Universal Library.) First published in 1878, this book is a fuller record than the *Recollections of the Last Days of Shelley and Byron*, first published in 1858.

For further reading on the subject see references at end of first instalment of article.

Reviews of Books

THE ENGLISH VILLAGE COMMUNITY

The English Village: The Origin and Decay of its Community. An Anthropological Interpretation. By HAROLD PEAKE, F.S.A. (Benn Bros., Ltd., 15s.)

The Rural Community. By LLEWELLYN MACGARR, M.A. (Macmillan & Co., Ltd., 8s.)

Mr. Peake's study of the English Village Community is in many respects a notable achievement. It is the work of a scholar of wide reading and acute perception, who has a quick grasp of the essential in a mass of detail, and is able to see it in its proper perspective in relation to the broad outline of his thesis. Its outstanding feature, which to many will seem the most original, is the manner in which Mr. Peake has brought the results of recent anthropological research in the ethnology of Europe and of Britain to bear upon the problems of the origin and form of the Village Community as it appears in the historical records of this country.

Early Village Communities in England fall in the main into three classes: the Moorland Village, which is pastoral rather than agricultural, and is sometimes regarded as

"Celtic"; the Valley Village; and the Forest Village. Of these three, Mr. Peake deals at greatest length with the Valley Village, which he regards as a normal type in this country, the Moorland Village belonging to a more primitive form which survived only in the less favourable environment of a hilly and remote country, and the Forest Village being a later product of special conditions. The characteristics of the fully developed Valley Village Community are common possession of meadow-land for hay, arable fields cultivated in common on the three-field system, and a common pasture for flocks and herds. Usually, but not invariably, there is associated with the Village Community an overlord, who receives tribute from the members of the community, in service or kind, and acts as their protector and arbiter of disputes. The existence of an overlord in a social unit, which is essentially democratic and communistic, is an anomaly not hitherto satisfactorily explained.

The problems which the author has set himself to solve in the early part of his book are firstly, "What is the origin of these three types of community, and what are their relations one to another?" and, secondly, "How is it possible to account for the anomalous position of the overlord?" He has attacked these problems with a bold originality which some of his readers may think borders upon temerity, for in his suggested solution he has not only drawn upon the results of anthropological and archaeological research, but he has ventured upon the more debatable ground of racial psychology. The extent to which his argument is recognised as valid will depend on the degree to which his readers are prepared to accept not only his theory of the persistence of mental characters, whether due ultimately to environmental or racial influence—a matter upon which Mr. Peake appears to have more or less an open mind—but also upon their agreement in his analysis of the different types of mentality which he associates with the physical differences upon which the racial classification is made to depend by the anthropologist. Although Mr. Peake's arguments may go far to convince, it must be remembered that they are based largely upon inference and personal impression. The scientific study of the association of mental character and race has far to go before the psychologist can speak with the authority of the physical anthropologist. Subject to this reservation it must be said that Mr. Peake makes out a strong case.

Only those who are acquainted with the works which Mr. Peake himself has published elsewhere will appreciate the originality of the summary of the ethnology of Europe in general and of these islands in particular upon which his anthropological argument is based. In order to give some idea of the force of this argument, it is necessary to indicate briefly the line which has been followed by Mr. Peake in his research. After summarising the theories which at present hold the field in regard to the development and relation of the different modes of life, hunting, pastoral, and agricultural, of primitive man, he maintains that the essential features of the agricultural form alone are such as would produce the material conditions and the habit of mind which, acting in combination, would be

capable of originating and developing the Village Community. On cultural and psychological grounds, therefore, Mr. Peake holds that the origin of the Village Community may, with reasonable probability, be assigned to the Neolithic Lake Dwellers of Central Europe—the broad-headed Alpine race—by whom agriculture was introduced from Asia. As is well known, the races of Europe fall into three broad groups, the long-headed Mediterranean, represented in Britain by the early neolithic peoples, the broad-headed Alpine, and the long-headed fair Nordic peoples. To these is sometimes added a fourth group with Mongoloid affinities to which Mr. Peake, with adequate reason, is inclined to attribute more importance than most writers. Any problem, however, which depends for its solution upon the evidence afforded by racial characters is complicated by the fact that contact and admixture between these groups of peoples have produced intermediate varieties which have sufficient permanence to be regarded as sub-types. It is to one of these, the group of broad-headed peoples known as the Beaker-folk, who arrived on the east coasts of these islands a little before the introduction of bronze, that Mr. Peake would mainly assign the origin of the Moorland Village. The Beaker-folk he holds to be the result of contact between Nordic nomad pastoralists and Alpines. About 1250 B.C. the Nordic tribes who inhabited the Russian steppes spread over the greater part of Europe, conquering the agricultural people whom they encountered and ruling over them as a military caste. The course of their wanderings, which extended to Great Britain and Ireland, has been traced by Mr. Peake by means of finds of their characteristic leaf-shaped swords, while the number of bronze sickles found in France and in this country have suggested to him that the Nordic conquerors brought with them as their subjects and followers a considerable number of the broad-headed agriculturists of Central Europe. On settling in this country, they founded a Village Community of the type with which they were familiar on the Continent in the form of the Valley Community on the three-field system, the Nordic leader developing into the village overlord.

The Forest Village, on the other hand, with its one or two-field system, Mr. Peake regards as a special product of the conditions which followed on the Anglo-Saxon invasion. As has been seen, he does not agree that the Anglo-Saxons originated the Village Community, as has sometimes been thought. He holds that they found it already in existence and adopted it, but were responsible for the Forest Village as a later off-shoot on the model of the one-field system of their home in North Germany.

This brief and inadequate summary must suffice to indicate the trend and quality of the author's line of reasoning; nor is it possible to deal with his account of the development of the Village Community in mediæval times and its gradual decline and extinction. In this he is on more familiar ground. His forecast in the final chapter of a possible rebirth of the Village Community suggests a comparison and a contrast with Mr. MacGarr's careful study of the Rural Community in America, where, notwithstanding the difference of conditions, the problems to be faced are fundamentally the same. Their solution,

as both authors indicate, lies in the success of the attempt to secure for the inhabitants of rural districts a fullness of life and interest, upon lines which each suggests, to counter the attractions of the conditions of life in a town.

E. N. FALLAIZE.

A POPULAR EXPOSITION OF EINSTEIN'S THEORY

The Theory of Relativity and its Influence on Scientific Thought. By A. S. EDDINGTON, M.A., F.R.S. (Clarendon Press, Oxford, 2s.)

Professor Eddington's "Romanes Lecture" is as good a Romane as we have heard or read, and we are giving two somewhat lengthy extracts from it in the hope that they will send readers to the original. The first describes a deduction from Einstein's theory not usually mentioned in popular expositions of it; the second draws an interesting comparison between a flat earth and a flat world.

I will conclude this part of the argument with an experimental application which illustrates the power of Einstein's method. Much study has of late been given to electrons moving with very high speeds; for example, the β particles shot off from radio-active substances are negative electrons which sometimes attain speeds of 100,000 miles a second. It is found by experiment that the rapid motion produces an increase of mass of these particles. I want to show that the theory of relativity gives a very simple explanation of just how this increase of mass occurs. But I must first remark that an explanation had been previously given which had generally been accepted as satisfactory. The phenomenon was actually predicted by J. J. Thomson before relativity was thought of; because, assuming that the mass of a β particle is of electrical origin, an application of Maxwell's equations shows that it ought to increase with velocity. But the precise law of increase cannot be predicted on this basis, since various plausible assumptions lead to slightly different results. . . . Einstein takes us straight to the root of the mystery, and he clears up one point which was misleading, if not actually wrong, in the older explanation. The change of mass does not in any way depend on whether the mass is of electrical origin or not; it arises simply from the fact that mass is a *relative* quantity depending by its definition on the relative quantities length and time. Let us look at the β particle from its own point of view; it is just an ordinary electron in no way different from any other. "But it is travelling unusually rapidly?" "That," says the electron, "is a matter of opinion. So far as I am aware I am at rest, if the word 'rest' has any meaning. In fact I was just contemplating with amazement *your* extraordinary speed of 100,000 miles a second with which you are shooting past me." Of course our motion is of no particular concern to the electron, and it will not modify its condition on our account, so it keeps its mass, radius, electric field, etc., equal to the standard constants applying to electrons in general. These terms are relative, and refer therefore to some particular frame of space

and time—clearly the frame appropriate to an electron in self-contemplation, viz. the one with respect to which it is at rest. But this frame is not the usual geocentric frame to which we refer quantities such as length, time, and mass; there is a difference of 100,000 miles a second between our station of observation and that of the β particle in self-contemplation. It is a mere matter of geometry to discover what the β particle's lengths and times become when referred to the partitions which we have drawn across the world. But when we calculate the consequential change of mass resulting from the changes of length and time, we find that it should be increased in precisely the proportion indicated by the most refined experiments.

The ancients believed that the earth was flat. The small portion of its surface with which they were chiefly concerned could be represented without serious distortion on a flat map. As more distant countries were added, it would be natural to think that they also could be included in the flat map. You have all seen such maps of the world, e.g. Mercator's projection, and you will remember how Greenland appears enormously exaggerated in size. Now those who adhered to the flat-earth theory must hold that the flat map gives the true size of Greenland. How then would they explain that travellers in that country reported that the distances were much shorter? They would, I suppose, invent a theory that a demon resided in that country who helped travellers on their way, making the journeys appear much shorter than they "really" were. No doubt the scientists would preserve their self-respect by using some Graeco-Latin polysyllable instead of the word "demon," but that must not disguise from us the fact that they "really" were appealing to a *deus ex machina*.

The name demon is rather suitable, however, because he has the impish characteristic that we cannot pin him down to any particular locality. We might equally well start our flat map with its centre in Greenland; then it would be found that journeys there were quite normal, and that the activities of the demon were disturbing travellers in Europe. We now recognise that the true explanation is that the earth's surface is curved; and the demoniacal complications appeared because we were forcing the earth's surface into an inappropriate flat frame which distorts the simplicity of things.

What has happened in the case of the earth has happened also in the case of the world, and a similar revolution of thought is needed. An observer, say at the centre of the earth, finds that there is a frame of space and time—a flat or Euclidean frame—in which he can locate things happening in his neighbourhood without distorting their natural simplicity. There is no gravitation, no tendency of bodies to fall, so long as the observer confines his observations to his immediate neighbourhood. He extends this frame of space and time to greater distances, and ultimately to the earth's surface, where he encounters the phenomenon of falling apples. This new phenomenon must be accounted for, so he invents a *deus ex machina* which he calls gravitation, to whose

activities the disturbance is attributed. But we have seen that we may just as well start with the falling apple. It has a flat frame of space and time into which phenomena in its neighbourhood fit without distortion; and from its point of view bodies near it do not undergo any acceleration. But when it extends this frame farther afield, the simplicity is lost; and it, too, has to postulate the demon force of gravitation existing in distant parts, and for example causing undisturbed objects at the centre of the earth to fall towards it.

As we change from one observer to another—from one flat space-time to another—so we have to change the region of activity of this demon. Is not the solution apparent? The demon is simply the complication which arises when we force the world into a flat Euclidean space time frame into which it does not fit without distortion. It does not fit the frame, because *it is not a Euclidean or flat world*. Admit a curvature of the world and the mysterious disturbance disappears. Einstein has exorcised the demon.

SCIENTIFIC BOOKS

Inorganic Chemistry. By T. MARTIN LOWRY, D.Sc., F.R.S. (Macmillan & Co., 28s.)

This is an excellent book, undeniably the best of its kind in English. The worst that one may say about it is of its cost, which is distressingly expensive. But its purchase is worth while. It covers the ground of inorganic chemistry which lies between that traversed by the elementary books like *Alexander Smith* and the larger treatises like *Roscoe*. For the first time in a general textbook we have the newer subjects such as atomic number, isotopes, crystal structure, and Langmuir's theory of valency not only explained but given their proper place in the scheme. Very wisely Dr. Lowry has obtained the assistance of specialists in several subjects in which he does not profess a first-hand knowledge: in the sections on isotopes, on pigments, on photography, on glass, and in the chapter on radio-activity. So that, although the field covered is broad, there is a sureness of touch nearly everywhere which the conscientious compiler with his system of card-indexes has never attained.

A happy feature of this book is the important place given to metals and their alloys. The average textbook of chemistry stresses the non-metals too much, and one of the reasons why students do not like chemistry at first is because they are tired of hearing about hydrogen and ozone. Dr. Lowry gives the metals their due. He deals with them from the physical-chemical standpoint. Another obviously good feature is the excellence of the diagrams, especially the beautiful photographs of crystals which have been well chosen and well reproduced.

This book is recommended to the serious student who wants an informed and comprehensive account of the whole subject in one volume, something more than that contained in the elementary books studied at school or in the first two years at college, and less than that in the larger treatises or monographs. It is nevertheless a book for the general reader also. Some textbook writers

forget their readers and write to placate imagined critics. This book is written for its readers; a fact evident not only in the pains the author has taken to have his information accurate and up-to-date, but in the clear and concise manner in which it is set forth.

The A B C of Wireless. A Popular Explanation. By PERCY W. HARRIS. (The Wireless Press, 6d.)

A plain straightforward attempt by the editor of *Conquest* to tell the man in the street the elements of wireless. Well written and printed, with a few excellent photographs.

Within the Atom. A popular view of Electrons and Quanta. By JOHN MILLS. (George Routledge and Sons, 6s.)

The author knows what he is writing about, but is mistaken in believing he is appealing to the general reader. He tells us he wishes to make himself understood by those "who have no previous knowledge of electricity, mechanics, or chemistry," and then proceeds to pour out such a vast store of information of a highly technical kind that one would need to have an F.R.S. at one's elbow as one reads. What he does do is to describe briefly and, in the main, accurately the latest work on the structure of the atom and related problems. But only those who have already studied these matters in the usual textbooks will appreciate what he is describing. We think it is doubtful if such a complicated thing as the inside of an atom can be explained in popular terms. A writer would require to be exceedingly clever to write such a description; it would be an unselfish piece of work. And one thing the writer must do is to consider his intended readers, and not simply, consciously or unconsciously, as so many do, write to please himself or to keep himself in the good estimation of his friends. This, we think, is what Mr. Mills has done. And so he has fallen between two stools; for the weaker brethren can digest little of this book and the strong will like their meat fresher.

Life and the Laws of Thermodynamics. By SIR W. M. BAYLISS, M.A., D.Sc., F.R.S. (H. Milford, 1s.)

Sir William Bayliss' "Boyle Lecture" to the Junior Scientific Club of Oxford University is hardly up to the usual level of these lectures. It is evident that the lecturer has been pressed to avoid technicalities and to keep simple, and we think he has taken the injunctions to heart too literally.

A. S. R.

Man the Animal. By W. M. SMALLWOOD, Ph.D. (New York: The Macmillan Company, 12s.)

One of the most difficult tasks of the man of science is to write a good popular book on his subject. The present volume is a gallant attempt. It contains some admirable photographs, bringing home very vividly the early steps in embryology, and the appearance of cells and tissues under the microscope, and treats of a variety of interesting topics. It has two ambitious chapters on methods of learning in man and animals. But it is somewhat too didactic, and often lays down natural "laws"

with the moral earnestness of a Moses or a Hammurabi.

It has many small faults of detail, and some large ones of perspective; but it is an interesting little book, which most educated people could read with profit, especially if they could read it critically. J. S. H.

NOTES FROM CONTEMPORARIES

In recent years controversies have raged as to the extent of ancient Egyptian influence on the literature of the Bible. The debt of the Biblical writers to Egypt seems to be put beyond doubt in a scholarly and brilliant article by Dr. A. B. Mace in vol. ix of the *Annals of Archaeology and Anthropology*, published by the University of Liverpool (6s.). Dr. Mace divides his evidence into three parts: (1) Influences on the form of poetry; (2) Influences on the general character of the literature; (3) Influences on religious doctrine. In the first part he points out the well-known quality of Hebrew poetry which "depends to a certain extent on rhythm, but more particularly on a parallelism of words or thought between the different parts of the verse." This is a very unusual form of poetry, "yet we find it fully developed in Egypt in 2000 B.C., and distinct traces of it a thousand years before that." To take only one of the examples quoted of this type of parallelism:

O Lord, how manifold are Thy works !
In wisdom hast Thou made them all.
Psalm civ. 24.
How manifold are Thy works !
They are hidden from before us.
Hymn to Atone.

In the second part of the evidence we are given profuse examples of Egyptian influence on the subject-matter of Hebrew lyrical poetry—the Psalms, the Song of Solomon, etc.; on the Didactic books—Job, Proverbs, Ecclesiastes; and on the Prophetic Books. The Book of Job, for instance, in so far as the first portion of the tale is concerned, has an interesting forerunner in the Dialogue of a Misanthrope, written probably at least fifteen hundred years earlier. "In the Misanthrope we get the picture of a man once prosperous brought to ruin, deserted by friends and relatives, and stricken with disease. His name has become 'a stench in the nostrils' of man. In this plight he holds an argument with his soul as to whether it is not better to die than to live. The conclusion he comes to is that life under present conditions is impossible, that death will be a happy release, and that after death there will at least be justice done, and that the innocent will not suffer with the guilty." Of Egypt's religious influence Dr. Mace says: "Help for the poor, justice for the oppressed, belief in righteousness for its own sake, personal relationship with God—all these were known and practised in Egypt before they were thought of in any other country."

Many interesting photographs and details of the latest and largest addition to the transatlantic liners, in fact the largest vessel in the world, are given in the July number of the *Scientific American* (New York: Munn and Co., 35 cents). The *Majestic* has a tonnage of

56,000, nearly 10,000 tons above that of the *Olympic*, a length of 956 feet, a maximum speed of 24½ knots (oil-fired boilers have been installed), and accommodation for 4,100 passengers. We often hear the term "floating hotels" applied to modern liners, but the *Majestic* would be a super-hotel, if she were run up on land. Her main dining-room seats 652 persons, and her main lounge, which is fitted with beautiful oak panelling and carving and is not supported by any interior columns, is 76 feet long and 54 feet broad. The second-class accommodation is as good as the first-class on most liners, and the third-class has its lounge, smoking room, and dining saloon. The swimming-bath is modelled on the lines of the ancient baths in Pompeii, and is finished in marble and rich mosaics. The vessel has seven and a half acres of decks, and a walk through all the corridors and public rooms would take well over two hours; in fact one would have to cover a distance of nine miles.

Sir J. George Scott contributes an article, full of colour, on *Burma* to the July-August issue of *The Blue Peter* (1s.), a magazine of sea-travel to be found on most of the liners going out East. The current idea about Burma is that it is "a land of dismal swamps." This is far from the case, as even the railway traveller will realise. "From the flat rice-fields he passes into the dense teak forests of Pyinmana, goes on through the undulating 'dry zone,' where prickly plants and gnarled trees show how hot it can be in the dry season . . . ; then on to the irrigated country close under the hills of the Shan plateau. And everywhere there are pagodas and monasteries; the pagodas perched on heights or embowered in mango and acacia trees; some washed snow-white; some glinting bright with gold-leaf, and the monasteries with multiple roofs and gables carved in teak with the artistic skill for which the Burman is famous."

Those of our readers who heard the gypsy-songs of M. Balieff's *Chauve-Souris* Company in London last year will find much to interest them in Mr. Gilliat-Smith's article on "Russian Gypsy Singers" in the current *Journal of the Gypsy Lore Society* (printed privately by T. & A. Constable, Ltd.).

Mr. Gilliat-Smith, who is something of a modern George Borrow, has lately been studying the songs of gypsy refugees from Russia in Sofia. "The songs of the St. Petersburg gypsies," he says, "consist of Russian 'Gypsy Romances,' mostly in the Russian language and in the Russian style. Like all such songs they depend for their effect largely on their method of delivery. The gay ones are wild, furious, licentious. The sad ones, which far outnumber the former, are sung with infinite pathos, little half-sobs frequently catching at the voice, which is utterly untutored, so much so that the singer often uses up her store of breath on the forte portion, with the result that the pianissimo parts tend to become nearly an inaudible whisper. Many of these songs now exist in good gramophone records, notably those of Varja Pánina, the famous Moscow singer, who died some years ago, and though quite an old woman, went on singing to the end, enjoying greater and greater popu-

larity. Besides these, there are the unprinted gypsy songs, almost entirely in Romani, said to be of great age (*garatuné giljá*), sung to wilder music than the Russian romances, and said to be brought straight from the tents, from the Nomad Gypsies (*felditkone romender*). These latter continually send recruits to the town singers, whose dialect is not markedly different from theirs. All these songs are harmonised, there being always a first and a second voice. Each verse consists of from two to four lines, and between each verse the voices sing, again in harmony, the refrain, to which there are no words, and which consists of tra-ra-ri-ras, etc., *ad libitum*. The guitars accompany both the song and the refrain, but do not strum alone between the verses, as they do in Spain."

Books Received

(Mention in this column does not preclude a review.)

ANTHROPOLOGY AND ARCHAEOLOGY

The Rural Community. By LLEWELLYN MACGARR, M.A. (The Macmillan Company, 8s.)
Historical Sites in Palestine. By Lt.-COM. V. L. TRUMPER, R.N.R., M.R.A.S. (Marshall Bros., 3s. 6d.)

LITERATURE

Macbeth, King Lear and Contemporary History. By LILIAN WINSTANLEY, M.A. (Cambridge University Press, 15s.)

MISCELLANEOUS

Cold Light on Spiritualistic Phenomena. By HARRY PRICE, F.R.N.S. (Kegan Paul, Trench, Trübner & Co., Ltd., 6d.)
The Conquest of the New Zealand Alps. By SAMUEL TURNER, F.R.G.S. Illustrated. (T. Fisher-Unwin, Ltd., 21s.)

PHILOSOPHY AND PSYCHOLOGY

The Poetic Mind. By PROF. F. C. PRESCOTT. (The Macmillan Company, 9s.)
Fundamental Conceptions of Psycho-analysis. By A. A. BRILL, Ph.B., M.D. (George Allen & Unwin, Ltd., 12s. 6d.)
Outwitting Our Nerves. A Primer of Psychotherapy. By JOSEPHINE A. JACKSON, M.D., and HELEN M. SALISBURY. (Kegan Paul, Trench, Trübner & Co., Ltd., 7s. 6d.)
Juvenile Delinquency. By HENRY H. GODDARD. (Kegan Paul, Trench, Trübner & Co., Ltd., 3s. 6d.)
The Philosophy of Humanism. By VISCOUNT HALDANE. (John Murray, 12s.)

SCIENCE

The British Association for the Advancement of Science: A Retrospect, 1831-1921. By O. J. R. HOWARTH, O.B.E., M.A. (The British Association, Burlington House, Piccadilly, W.1, 7s. 6d.)

An Introduction to Electrodynamics. By PROF. LEIGH PAGE, Ph.D. (Ginn & Company, 10s.)

Modern Microscopy. By M. I. CROSS and MARTIN J. COLE. Fifth Edition, revised and rearranged by Herbert F. Angus. (Baillière, Tindall & Cox, 10s. 6d.)

The "Green Ray" or "Green Flash" (Rayon Vert) at Rising and Setting of the Sun. By PROF. DR. M. E. MULDER. (T. Fisher Unwin, Ltd., 6s.)

The Psychic Life of Insects. By PROF. E. L. BOUVIER. Translated by L. O. Howard, M.D., Ph.D. (T. Fisher Unwin, Ltd., 8s. 6d.)

The Tutorial Chemistry. Part II. Metals and Physical Chemistry. By G. H. BARLEY, D.Sc., Ph.D. (University Tutorial Press, 6s. 6d.)

The fourth edition of a book deservedly popular among students preparing for pass examinations in the University of London. The best *cheap* book on general and inorganic chemistry in print.

Metallurgy of Iron and Steel. Based mainly on the work of Sir Robert Hadfield, F.R.S. Edited by R. E. NEALE, B.Sc. (Sir Isaac Pitman & Sons, Ltd., 2s. 6d.)

A compilation made by the editor of Pitman's Technical Primers. It is too short and too general for the student, but excellent for the general reader.

Handbook of Commercial Geography. By GEO. G. CHISHOLM, M.A., B.Sc. Ninth edition. (Longmans, Green & Co., 25s.)

The eighth edition of this important work was published in March 1911. The new edition describes Europe and the world as far as facts about them can be ascertained in the present year, and is the result of a drastic revision of the old. The book gains in value with each new edition. To praise a work which has been in existence for thirty-three years would be superfluous.

Journal of Scientific Instruments. Preliminary Number. May 1922. (The Institute of Physics, 2s. 6d.)

The first number of this periodical is well edited and produced, appears to be strongly backed, and shows great promise. Its future will depend, we are told, upon the numbers willing to subscribe. No journal at the present time deals adequately with the subject-matter of this one—scientific instruments. It should therefore have a wide appeal and be of great service. With the backing of the recently founded Institute of Physics and with the co-operation of the National Physical Laboratory it should occupy a permanent position in the stream of indispensable scientific literature.

Notes on Quantitative Analysis. Supplement. By H. J. H. FENTON, Sc.D., F.R.S. (Cambridge University Press, 3s. 6d.)

A supplement to Dr. Fenton's well-known *Notes on Quantitative Analysis*, giving the chief reactions and properties of the rarer elements, and of a considerable number of organic and inorganic compounds which were not described in that book. Chemical students will find this book useful both in their practical and theoretical work.

Correspondence

THE PROBLEM OF PERSONALITY

To the Editor of Discovery

SIR,

The correspondence in your columns on the subject of Personality and its basis or bases adds weight to your original suggestion that there was need for classification and collation of the different views on the subject.

Might I endeavour in the fewest possible words to give the views of a biologist? In face of the short space at my disposal, I shall be forced to make what appear dogmatic assertions: may I make it clear at the outset that the assertions represent simply my own opinions (although I also think that many, perhaps most, biologists would agree with me), and that I could adduce evidence if space were available?

Modern biology, then, is coming to think of the organism as a unitary psycho-physical mechanism; both "mental" and "material" characters are properties of the living substance of which it is composed. Its view is therefore neither idealist nor materialist, but, if you like, monist. It is impossible to alter one function without altering others indirectly; thus the mental reacts upon the physical, and vice versa.

In considering the problem of personality, we have to distinguish at the very outset between *inherited* factors and *environmental* factors. Both of these may influence the personality. A good example is given, e.g., by worry. Worrying tends to a certain type of so-called neurasthenia. The fact of worrying, however, and its intensity, depend (a) upon the tangible "worries" which confront a man, but also (b) upon the degree of his hereditary predisposition to worry. Circumstances which one man will confront with equanimity may lead to a nervous breakdown in another. Or, again, phthisis depends (a) on an external factor, the tubercle bacillus, and (b) on a factor which is chiefly hereditary—the degree of resistance to infection. Practically all of us harbour tubercle bacilli; but in only a comparatively small percentage do they give rise to disease.

Personality in a similar way is partly dependent upon external, environmental factors—social conditions, infection, treatment when young, worry, etc. etc. These factors, however, undoubtedly play a relatively small part in forming personality compared with those which are hereditarily determined.

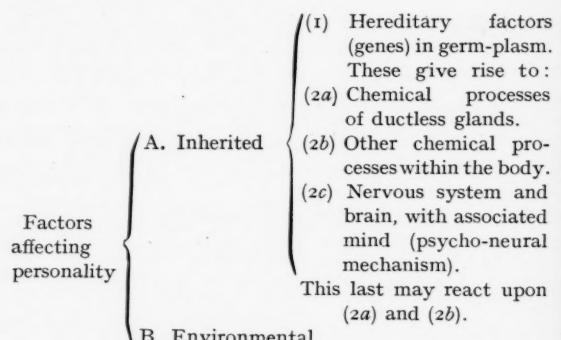
Here we have to think, so to speak, on several different levels. In the first place, there can be no doubt that the characters of body and mind alike are mainly determined by the hereditary factors or genes contained in the fertilised ovum and revealed to us by the work of Mendel, Bateson, Correns, Morgan, etc. During embryonic development, however, these give rise, *inter alia*, to the ductless glands, and thenceforth these are entrusted with a very important share in the regulation of growth, chemical processes, nervous reactions, etc. etc. There can be no

doubt that these glands, once formed, do exert pronounced effects upon the quality and types of the personality. Dr. Berman has been hasty in many of his generalisations, as well as neglectful of everything but the ductless gland system; but he has done good work in promoting discussion, and in making the public realise that personality is only a name for a balance of elements in the organism, much of which is determined by the ductless glands. Numerous other chemical processes also occur which must react on the glands and brain and so affect personality.

Finally, we have the brain and the rest of the nervous system, whose development is also determined by hereditary factors in the germ-plasm. There is again no doubt but that inherited variations in general brain-type, and correspondingly in mind-type, do occur. For instance, some nervous systems appear to be more easily excitable than others; or, again, some minds make associations more readily, others less readily—this difference is probably at the bottom of the difference between the "introvert" and "extrovert" types of the modern psychologist. Many other general tendencies and special aptitudes of mind (e.g. music) are undoubtedly hereditary.

Finally, once the brain and mind have been formed in development, they may react upon the rest of the nervous system and through it upon the ductless glands.

We may sum up our conclusions in diagrammatic form, thus:



It is of course for certain purposes possible to think of the organism on a purely mechanical, or a purely chemical, or a purely mental basis. Any such view, however, is bound to be partial.

Mechanical, chemical, electrical, mental processes all occur within the organism; the organism can only be considered as a whole; and in considering any complex property of the organism as a whole, such as personality, we cannot neglect any of these various factors. The problem is extremely complex, but does not present any logical difficulty if looked at from the monistic angle I have indicated.

Yours, etc.,
J. S. HUXLEY.

NEW COLLEGE, OXFORD.

June 6, 1922.

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